GEOLOGICAL SURVEY OF OHIO

WILBER STOUT, State Geologist

FOURTH SERIES, BULLETIN 34

ANALYSES OF THE COALS OF OHIO

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COLUMBUS
1929

Published by authority of the Legislature of Ohio, under the Supervision of the State Geologist.

Printed by the Kelly-Springfield Printing Company
Springfield, Ohio

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By F. A. RAY

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INTRODUCTION

Coal may be called the corner stone of our industrial civilization. Although water power, petroleum, and natural gas are being used more and more in the development of mechanical and electrical energy, the demand for coal goes forward at an unabated rate, so much so in fact that the use of this fuel is an excellent measure of the industrial condition of the country.

Inquiries about the coals of Ohio are frequent and urgent. While the information available is extensive, it is widely scattered and therefore accessible to but few. For this reason this bulletin has been prepared. It gives the important facts about the coals—areas of the deposits, thickness of beds, nature of the roof, composition, heating value, and uses. Persons desiring more detailed information should consult other publications of the Geological Survey of Ohio.

The coals of Ohio are all bituminous. They vary in ash, sulphur, fixed carbon, volatile matter, heating value, coking properties, and strength; but in these the variations are relatively small.

The great use of Ohio coal is for steam generation and for general heating, and for these purposes it is excellent. Many states and countries would consider themselves extremely fortunate to possess Ohio's coal deposits.

Production of coal in the United States for certain years was:

	Short tons
1821	1,322
1830	320,072
1850	7,018,181
1870	33,035,580
1890	157,770,963
1910	501,596,378
1918	678,211,904 (maximum)
1926	657,804,437
1927	597,859,000
1928	569,489,000*

*Estimated

For Ohio the figures are as follows:

	Short tons
1838	119,952
1850	640,000
1870	2,527,285
1890	11,494,506
1910	34,209,668
1920	45,878,191 (maximum)
1926	27,872,488
1927	15,800,000
1928	15,095,000*

The coal beds of Ohio are all of Pennsylvanian age except a few in the hilltops of the southeastern part of the State which are classed with the Permian, Dunkard, or Upper Barren measures. These beds, however, are thin or carry such impurities that they never can be of value except perhaps for farmers or an occasional village.

According to Stout, fifty-two coal beds have been recognized and named in this State. Of these about sixteen have been mined for railroad shipment or are now so mined, and sixteen others have been worked by drifting for local consumption.

SUBDIVISIONS OF COAL-BEARING ROCKS OF OHIO

The coal-bearing rocks of Ohio are divided as follows:

Permian system	Dunkard series	600 feet
Pennsylvanian system	Monongahela series	260 "
	Conemaugh series	350 to 500 "
	Allegheny series	180 to 220 "
	Pottsville series	200 to 300 "

The structure of Ohio coal beds varies greatly. In places a bed may consist of a solid block of coal but elsewhere it may be divided into two or more benches, separated by layers of clay or shale from a fraction of an inch to a foot or even more in thickness. Numerous details on this topic are given on the following pages.

The dip of the rocks with theincluded coal beds is on the whole uniform and south-of-east at an average rate of about 35 feet per mile. Where anticlines or synclines occur the dip of course varies or may even be reversed. Illustrations of this occur near Newport, Washington County, where the Burning Springs anticline crosses the Ohio River; in the vicinity of Macksburg in the northern part of the same county; in southeast Belmont County; near Mineral City, Tuscarawas County; in eastern Harrison County; and in a small way at several other places.

*Estimated

GENERALIZED SECTION OF OHIO

System	Series	Bed and Member	Thickness Ft.	Thickness In.	Interval Ft.	Interval In.	Fields
		Sandstone, *Gilmore*	20	0			
		Shales, variable	32	0			
		Limestone, local, *Gilmore*	2	0			
		Shales, variable	61	0	178	0	
		Sandstone, local, *Nineveh*	52	0			
		Shales, soft to hard	10	0			
		Coal, local, shaly, *Nineveh*	1	0			53 No value
		Limestone, irregular, *Nineveh*	8	0			
		Shale and shaly sandstone	91	0	100	0	
	Greene	Coal, thin, shaly, local, *Hostetter*	1	0			52 No value
		Shales, variable	39	0			
		Coal, very local, *Fish Creek*	1	0	40	0	51 No value
		Shale, soft to hard	10	0			
		Sandstone, local, *Fish Creek*	20	0	45	0	
		Shales, variable	14	0			
		Coal, local, impure, *Dunkard*	1	0			50 No value
		Shale, irregular	7	0			
		Sandstone, local, *Jollytown*	25	0	42	0	
		Shales, variable	8	0			
		Coal, local, impure, *Jollytown "A"*	2	0			49 No value
					405	0	
		Shales, variable	1	0			
		Limestone, irregular, *Upper Washington*	5	0			
		Shale, variable	3	0			
Permian		Sandstone, local, *Hundred*	17	0	49	0	
		Shales, variable	3	0			
		Sandstone, *Upper Marietta*	16	0			
		Shale, siliceous	2	0			
		Coal, shaly, local, *Washington "A"*	2	0			48 No value
		Shales, local	8	0			
		Limestone, *Middle Washington—Creston Reds*	7	0			
		Shales, soft to hard	26	0			
		Limestone, *Lower Washington*	9	0	63	0	
		Shale, calcareous	3	0			
	Washington	Sandstone, local, *Lower Marietta*	6	0			
		Shale, siliceous	1	0			
		Coal, shaly, *Washington*	3	0			47 Often thick but impure
		Shales, soft to hard	15	0			
		Coal, shaly, *Little Washington*	1	0	16	0	46 No value
		Shales, irregular	4	0			
		Sandstone, local, *Mannington*	30	0	42	0	
		Shales, variable	6	0			
		Coal, unsteady, *Waynesburg "A"*	2	0			45 Used locally near Sardis and New Matamoras
		Shales, soft to hard	9	0			
		Sandstone, rather steady, *Waynesburg*	30	0			
		Shale, gray, siliceous	5	0	51	0	
		Limestone, *Elm Grove*	2	0			
		Shale, gray, *Cassville*	5	0			
					221	0	
		Coal, fair purity, *Waynesburg No. 11*	1	4			44 Of most value in Belmont and southern Jefferson counties
		Shale and sandstone, *Gilboy*	14	6	16	0	
		Coal, persistent, *Little Waynesburg*		2			43 No value
		Limestone and marly shale, *Waynesburg*	10	0			
		Shale or sandstone, *Uniontown*	28	7	39	5	
		Coal, *Uniontown No. 10*		10			42 Worked locally on Sunfish Creek, Monroe County
		Shale, siliceous and limestone, *Uniontown*	5	0			
		Sandstone, *Arnoldsburg*	8	0			
		Coal, wanting, *Arnoldsburg.*					
		Limestone and calcareous shale, *Arnoldsburg*	37	0			
	Monongahela	Shale, green, or shaly sandstone, *Fulton*	4	0	110	2	
		Limestone and calcareous shale, *Benwood*	34	4			
		Sandstone, local, *Sewickley*	20	0			
		Coal, *Sewickley, Mapletown, Meigs Creek No. 9*	1	10			41 Well developed in Belmont, Noble, Morgan, Guernsey, and Muskingum counties
		Clay shale, calcareous	3	0			
		Sandstone, *Lower Sewickley*	19	6	23	1	
		Coal, persistent, thin, *Fishpot*		7			40 Seldom over 2 feet thick, fair quality
		Limestone and marly shale, *Fishpot*	32	1	33	5	
		Coal, unsteady, *Redstone, Pomeroy*	1	4			39 Coal of Pomeroy field
		Limestone and marly shale, *Redstone*	13	0			
		Sandstone, local, *Upper Pittsburgh*	9	0	25	7	
		Coal, persistent, *Pittsburgh No. 8*	3	7			38 Coal of Belmont, Federal Creek, and Swan Creek fields
					247	8	
		Clay shale		6			
		Limestone, irregular, *Upper Pittsburgh*	5	0	19	0	
		Clay shale	13	5			
		Coal, very local, *Upper Little Pittsburgh*		1			37 No value
		Clay shale	4	6			
		Sandstone, local, *Bellaire*	10	0			
		Shale, siliceous	2	5	17	0	
		Coal, seldom present, *Lower Little Pittsburgh*		1			36 No value
		Shale, variable	8	0			
		Limestone, *Summerfield, Lower Pittsburgh*	12	0			
		Shales, variable	26	0	69	0	
		Sandstone, local, *Connellsville*	20	0			
		Clay shale	2	10			
		Coal, local, *Clarksburg*		2			35 No value

		Limestone and marly shale, *Clarksburg*	4	0				
		Sandstone, local, *Morgantown*	30	0	34	1		
		Coal, usually wanting, *Elk Lick*		1			34	No value
		Limestone and marly shale, *Elk Lick*	5	0				
		Shale, variable	5	0				
		Shale, siliceous, *Birmingham*	10	0	20	5		
		Limestone, local, marine, *Skelley*		4				
		Coal, seldom evident, *Duquesne*		1			33	No value
		Shale, variable	9	0				
		Shale, siliceous	11	0				
		Limestone, siliceous, marine, *Gaysport*	1	0				
	Conemaugh...	Shale, siliceous	16	0	54	6		
		Limestone, marine, *Ames*	1	6				
		Shale, siliceous	15	0				
		Coal, persistent, *Harlem*	1	0			32	Used locally, Harlem Springs, Carroll County
		Clay, calcareous	3	0				
		Clay shale, red, *Round Knob—Pittsburgh*	12	0				
		Sandstone, local, *Saltzburg*	8	0	26	0		
		Shale, siliceous	2	0				
		Coal, local, *Barton*	1	0			31	No value
		Clay shale	4	0				
		Limestone, ferruginous, *Ewing*	1	0				
		Shale, siliceous	3	0				
		Sandstone, local, *Cow Run*	15	4	29	0		
		Shale, siliceous	2	0				
		Limestone, marine, *Portersville*	2	0				
		Coal, persistent, *Anderson*	1	8			30	Worked locally near Ava, Belle Valley, Chandlersville, and New Concord
		Clay shale	3	7				
		Limestone, local, *Bloomfield*	1	5				
		Shales, variable	19	0	30	0		
		Limestone, marine, *Cambridge*	4	0				
		Coal, unsteady, *Wilgus*	2	0			29	Best near Wilgus and Arabia, Lawrence County
		Clay shale	3	8				
		Shale or sandstone, *Buffalo*	23	0				
		Limestone, marine, *Brush Creek*	20	0	47	0		
		Coal, local, thin, *Brush Creek*		4			28	No value
		Shales, variable	10	6	11	0		
		Coal, local, *Mason*		6			27	No value
		Shale or sandstone, *Upper Mahoning*	10	0	11	0		
		Coal, *Mahoning, Groff*	1	0			26	Worked in Columbiana and Jefferson counties
		Clay, irregular, *Thornton*	5	0				
		Limestone, local, *Mahoning*	2	0	32	0		
		Shale or sandstone, *Lower Mahoning*	25	0				
					400	0		
		Coal, patchy, *Upper Freeport No. 7*	3	0			25	Worked extensively in Salineville, Freeport, Cambridge, Jacksonville, and Waterloo fields
		Clay and shale	7	0				
		Limestone and marly shale, *Upper Freeport*	2	0	12	3		
Pennsylvanian		Coal, local, thin, *Bolivar*		3			24	No value
		Clay, flint and plastic, *Bolivar*	5	0				
		Shale or sandstone, *Upper Freeport*	33	0	39	0		
		Coal, patchy, *Lower Freeport, Rogers*	1	0			23	Steubenville shaft, Bergholz, Amsterdam
		Clay, impure	2	6				
		Limestone, local, *Lower Freeport*	1	0	29	6		
		Shale or sandstone, *Lower Freeport*	25	0				
		Coal, seldom present, *Upper Kittanning*	1	0			22	No value
		Shale and sandstone	10	0				
		Shale, marine, *Washingtonville* (*Yellow Kidney* ore)	4	0	18	0		
		Coal, persistent, *Middle Kittanning No. 6*	4	0			21	Great bed of Hocking Valley, Tuscarawas Valley, and Sandy Creek
		Clay, siliceous	3	6				
		Limestone, impure, local, *Salem*		6	14	6		
		Shales, siliceous, with *Red Kidney* ore	10	0				
		Coal, local, *Strasburg*		6			20	Little value
		Clay, flint and plastic, *Oak Hill*	4	0				
		Shales, siliceous	3	0	13	4		
	Allegheny....	Limestone, unsteady, marine, *Hamden*	4	0				
		Coal, *Lower Kittanning No. 5*	2	4			19	Lawrence, Jackson, Tuscarawas, Carroll, and Columbiana counties
		Clay, plastic	5	0	5	4		
		Coal, shaly, local, *Lawrence*		4			18	No value
		Clay, flint and plastic	6	0				
		Shale and sandstone, *Kittanning*	8	2				
		Ore, irregular, *Ferriferous*		8	21	4		
		Limestone, marine, *Vanport*	6	0				
		Coal, seldom present, *Scrubgrass*		6			17	No value
		Shale, carbonaceous	5	0	9	0		
		Coal, patchy, *Clarion No. 4a*	4	0			16	Limestone coal of Lawrence, Jackson, Gallia, and Vinton counties
		Clay, flint and plastic	5	0				
		Ore, very local, *Canary*		6	17	0		
		Sandstone, irregular, *Clarion*	10	6				
		Coal, very local, *Winters*	1	0			15	Of value northern Jackson and southern Vinton counties
		Flint, impure, marine, *Zaleski*	1	0	2	0		
		Coal, local, *Ogan*	1	0			14	Little value
		Shale and sandstone	25	0				
		Limestone, marine, *Putnam Hill*	4	0	31	0		
		Coal, steady, *Brookville No. 4*	2	0			13	Widely distributed, best in Vinton, Jackson, Stark, Wayne, and Holmes counties
					212	3		

	Clay, plastic	4	0				
	Shale or sandstone, *Homewood*	10	0	15	0		
	Coal, local, *Tionesta No. 3b*	1	0			12	Worked locally near Zanesville
	Clay, plastic	5	0				
	Shale and sandstone	24	0				
	Ore, irregular, *Upper Mercer, Big Red Block*		4	32	0		
	Limestone or flint, *Upper Mercer*	1	8				
	Coal, patchy, *Bedford*	1	0			11	Cannel coal of Coshocton and Holmes counties
	Clay, siliceous	3	0				
	Shale and sandstone	7	0				
	Ore, siliceous, local, *Sand Block*		6	15	0		
	Shale and sandstone	3	6				
	Coal, local, *Upper Mercer No. 3a*	1	0			10	Worked locally in Scioto, Jackson, and Lawrence counties
	Clay, siliceous, plastic	3	0				
	Shale and sandstone	11	0				
	Ore, kidney, *Lower Mercer, Little Red Block*		3				
	Shale, siliceous	1	9	18	6		
	Limestone, steady, marine, *Lower Mercer*	2	0				
	Coal, steady, thin, *Middle Mercer*		6			9	Mine near East Greenville, Stark County
	Clay, siliceous, plastic	3	6				
	Shale and sandstone	5	0	9	0		
	Coal, thin, local, *Flint Ridge*		6			8	Cannel coal of Flint Ridge, Licking County
	Clay, plastic and flint	4	0				
	Shale and sandstone	5	0				
	Ore and limestone, marine, *Boggs*		6	11	6		
	Shale, siliceous	1	0				
	Coal, steady, thin, *Lower Mercer No. 3*	1	0			7	Used locally in Vinton, Jackson, and Scioto counties
Pottsville	Clay, siliceous	3	0				
	Shale and sandstone	23	0	28	0		
	Limestone or ore, marine, *Lowellville, Poverty Run*	1	0				
	Coal, thin, unsteady, *Vandusen*	1	0			6	Used locally in Jackson and Scioto counties
	Clay, impure	2	0				
	Shale and sandstone	17	0	20	6		
	Coal, local, *Bear Run*	1	6			5	Used locally in Jackson and Scioto counties
	Clay, siliceous	3	0				
	Shale or sandstone, *Connoquenessing* or *Massillon* (*Jackson Sand Block* and *Lincoln* ores in interval)	24	0	29	0		
	Coal, patchy, *Quakertown No. 2*	2	0			4	Important near Coalton and Wellston
	Clay, siliceous	5	0				
	Shale and sandstone	12	0	17	3		
	Coal, thin, local, *Huckleberry*		3			3	No value
	Clay, siliceous	3	0				
	Shale, argillaceous	1	0				
	Ore, local, *Guinea Fowl*		3	10	3		
	Shale, gray, siliceous	5	9				
	Coal, thin, *Anthony*		3			2	No value
	Clay, flint and plastic, *Sciotoville*	4	0				
	Shale and sandstone	20	0				
	Ore, local, marine, *Sharon*		3	32	0		
	Shale, siliceous	4	9				
	Coal, patchy, *Sharon No. 1*	3	0			1	Of value Massillon and Jackson fields
	Clay, impure	2	0				
	Shale, siliceous, irregular	5	0	18	0		
	Conglomerate, patchy, *Sharon*	10	0				
	Ore, local, impure, marine, *Harrison*	1	0				
				256	0		

There is great variation also in the roof of Ohio coals, as the sections which are given on the following pages show. Commonly it is shale which if strong forms the best type, but if weak or rotten increases the danger and the cost of mining. Sandstone if well cemented makes a strong roof, but the currents of water which brought in the sand may have removed a part of the vegetation and thus thinned the coal or in places cut it out entirely. Limestone makes a good roof unless it is much cut by cracks and joints. However, it is not common in this State to find limestone directly above the coal; a few inches at least of clay or shale is nearly everywhere between them. The Brookville or No. 4 coal and the Clarion or No. 4a are in places illustrations of Ohio coal beds with limestone immediately above or only a little higher.

The floor also of Ohio coals varies with the beds and from place to place with the same bed. Clay is by far the most common floor but in places it is sandstone or more rarely conglomerate. As a rule the floors of Ohio coals are even, but in places rolls or horses are present. Manifestly these diminish the thickness of the beds and increase the difficulty of mining. The Sharon or No. 1 coal in the Massillon field is a good example of a coal with an uneven floor.

POTTSVILLE SERIES

The rocks of this series in Ohio consist of coals, conglomerates, sandstones, shales, clays, limestones, flint or chert, and iron ores. Their maximum thickness, about 300 feet, is found in Scioto and Lawrence counties in southern Ohio.

Stout recognizes twelve coal beds in the Pottsville series of this State, the names and sequence being as follows:

Tionesta, No. 3b coal
Bedford coal
Upper Mercer, No. 3a coal
Middle Mercer coal
Flint Ridge coal
Lower Mercer, No. 3 coal
Vandusen coal
Bear Run coal
Quakertown, No. 2, or Wellston coal
Huckleberry coal
Anthony coal
Sharon, No. 1, Jackson Shaft, or Massillon coal

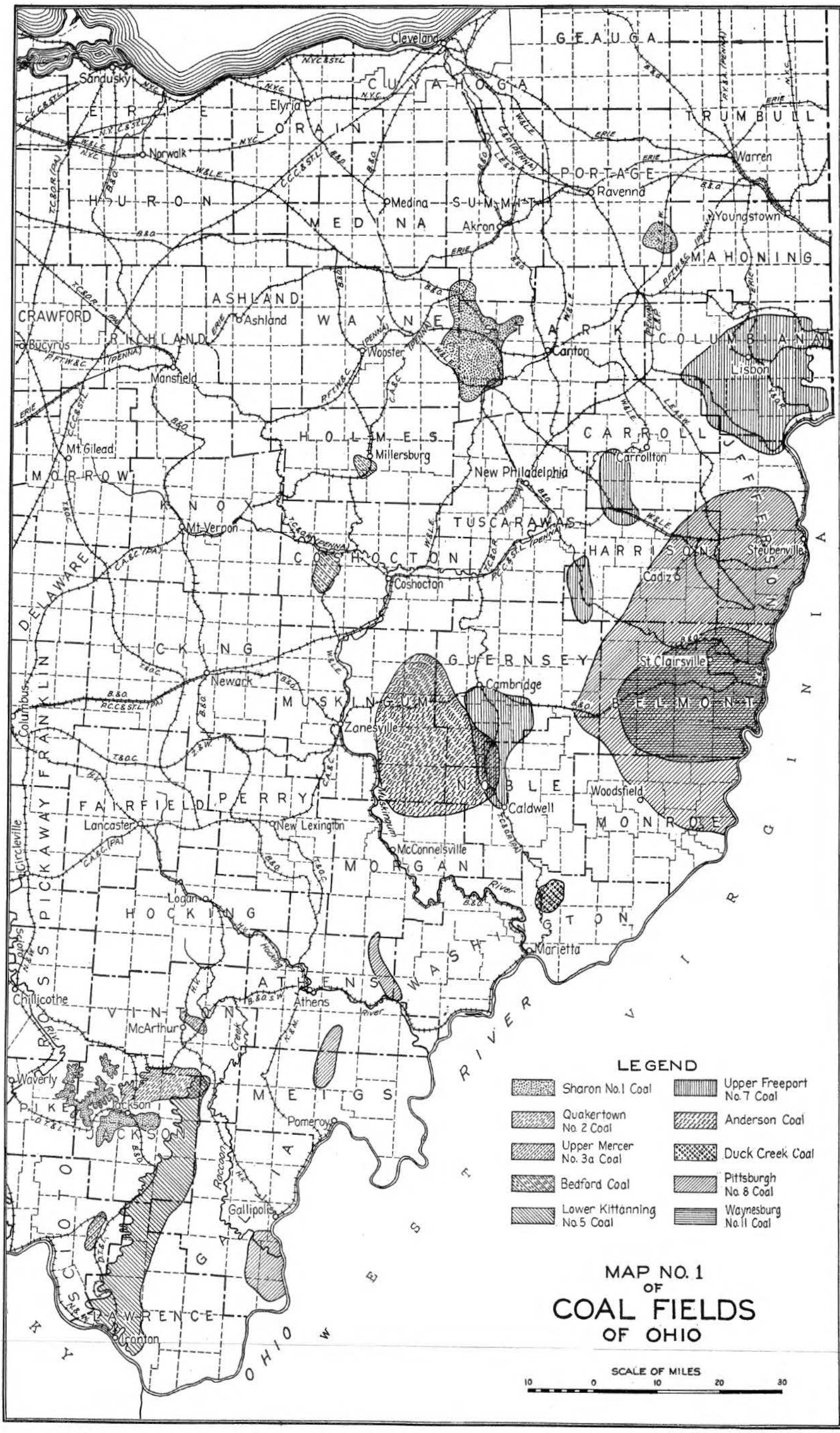
SHARON OR No. 1 COAL

The Sharon or No. 1 coal, known as the Massillon in northern Ohio and as the Jackson Shaft in the southern part of the State, is the lowest coal bed in Ohio. Like most beds it is patchy or discontinuous, and, while it is due on the outcrop for at least 300 miles, it is of workable thickness in only two fields which are small and widely separated.

The Massillon field

This field has Massillon for its center, hence the name Massillon coal. This bed has been mined in a large way in Stark, Wayne, Summit, Portage, and Mahoning counties, and in a small way in several others. Due partly to its original patchy distribution and partly to its subsequent removal by erosion, it formed small areas, the largest seldom attaining 300 acres.

The floor of the coal is commonly clay and the roof shale, but in places sandstone forms one or both. The floor is very uneven and the coal lies on distinct swells instead of flat surfaces or shallow basins. In thickness the bed seldom attains 5 feet and but little of it is more than 4 feet. In fact the great body mined has measured from $2\frac{1}{2}$ to 4 feet. The coal is singularly free from shale, clay, or other partings, and this adds to its purity. Fifteen samples showed an average of only 4.2 per cent ash. Films of "white cap" (calcium carbonate) are common on the surface and give the coal a spotted appearance. In places slope


Cleveland
Sandusky
Elyria
Norwalk
Medina
Akron
Ravenna
Warren
Youngstown
Ashland
Wooster
Canton
Lisbon
Bucyrus
Mansfield
Mt. Gilead
Millersburg
Carrollton
New Philadelphia
Mt. Vernon
Coshocton
Steubenville
Cadiz
Newark
Cambridge
St. Clairsville
Zanesville
Caldwell
Woodsfield
Lancaster
New Lexington
McConnelsville
Logan
Marietta
Chillicothe
Athens
McArthur
Waverly
Jackson
Pomeroy
Gallipolis
Ironton
Circleville
GEAUGA
CUYAHOGA
LORAIN
ERIE
TRUMBULL
PORTAGE
SUMMIT
HURON
MEDINA
MAHONING
CRAWFORD
ASHLAND
RICHLAND
WAYNE
STARK
COLUMBIANA
HOLMES
CARROLL
JEFFERSON
MORROW
KNOX
TUSCARAWAS
HARRISON
COSHOCTON
DELAWARE
LICKING
GUERNSEY
FRANKLIN
MUSKINGUM
NOBLE
MONROE
FAIRFIELD
PERRY
PICKAWAY
MORGAN
HOCKING
WASHINGTON
ATHENS
VINTON
MEIGS
PIKE
JACKSON
SCIOTO
GALLIA
LAWRENCE
OHIO RIVER
WEST VIRGINIA
PENNSYLVANIA
INDIANA
N.Y.C.
N.Y.C.&St.L.
C.C.C.&St.L.
W&LE
B&O
ERIE
P.F.W.&C.
C.A.&C.
T.&O.C.
T.C.&O.R.
L.E.&W.
P.C.C.&St.L.
Y.&M.V.
M.K.
H.K.
Hocking River
Scioto River
Raccoon Creek
Muskingum River
Little Kanawha River
Ohio River
LEGEND
Sharon No. 1 Coal
Quakertown No. 2 Coal
Upper Mercer No. 3a Coal
Bedford Coal
Lower Kittanning No. 5 Coal
Upper Freeport No. 7 Coal
Anderson Coal
Duck Creek Coal
Pittsburgh No. 8 Coal
Waynesburg No. 11 Coal
MAP NO. 1
OF
COAL FIELDS
OF OHIO
SCALE OF MILES
10 0 10 20 30

mining has been practiced, but elsewhere the work has been done by shafts which rarely attained a depth of 200 feet. In other words the coal everywhere lies near the surface.

While the principal use of the coal has been for domestic purposes, it formerly had a large call for making pig iron as it does not form a coke in burning and is very low in sulphur. Newberry said that in 1870 it formed the fuel by which fully half the iron produced in the State was manufactured.[1]

The regrettable feature is that so little of the coal was originally formed and that almost none remains to be mined.

Sections and analyses

Sample of Sharon coal from the Black Diamond mine on the property of Jones Brothers, 1¼ miles southeast of Diamond Post Office, Palmyra Township, Portage County. Shaft 97 feet deep. Sample cut in 1926 by T. R. Meyers and G. W. White. Analysis by D. J. Demorest.

		Ft.	In.
Shale, blue gray, good roof.			
Coal, bony, rejected	*Sharon*		3½
Coal, good, sampled	*Sharon*	2	¼
Clay shale floor.			

Proximate analysis

	As received	Moisture free
Moisture	15.19	0.00
Volatile matter	34.49	40.67
Fixed carbon	47.53	56.04
Ash	2.79	3.29
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.33	79.39
Hydrogen	6.23	5.35
Nitrogen	.96	1.13
Oxygen	22.07	10.11
Sulphur	0.62	0.73
Ash	2.79	3.29
	100.00	100.00

Air drying loss 11.24 per cent

		As received	Moisture free
Heating value	Calories	6,687	7,884
	B. t. u.	12,036	14,192

Fusion of ash	Incipient	2,527°F.
	Complete	2,619°F.

This is a wagon mine with a capacity of 50 tons per day.

[1]Newberry, J. S., Geol. Survey Ohio, Report of Progress in 1870, p. 26.

Sample of Sharon coal from the mine of the Quality Coal Co. on the property of Ross Streby in the southwest quarter of Section 9, Lawrence Township, Stark County. Shaft 183 feet deep. Sample cut in 1926 by T. R. Meyers and G. W. White. Analysis by D. J. Demorest.

		Ft.	In.
Clay shale, gray, good roof.			
Coal, bony, rejected	Sharon		1
Coal, very good, sampled	Sharon	2	10
Clay floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.56	0.00
Volatile matter	40 09	42.90
Fixed carbon	49.72	53.21
Ash	3.63	3.89
	100.00	100.00
Sulphur	0.87	0.93

Air drying loss 1.87 per cent

Heating value	Calories	7,336	7,850
	B. t. u.	13,205	14,130
Fusion of ash	Incipient	2,125°F.	
	Complete	2,192°F.	

This is a wagon mine with a capacity in 1926 of from 75 to 100 tons per day.

Sample of the Sharon coal from the August Heimann mine on the property of Lee Garber, east-central Section 24, Tuscarawas Township, Stark County. Shaft 140 feet deep. Sample taken in 1926 by T. R. Meyers and G. W. White. Analysis by D. J. Demorest.

		Ft.	In.
Shale, good roof.			
Coal, bony, rejected	Sharon		4
Coal, splint, sampled	Sharon	1	.2⅞
Clay shale, sampled	Sharon		⅛
Coal, good, sampled	Sharon	2	3
Clay floor.			

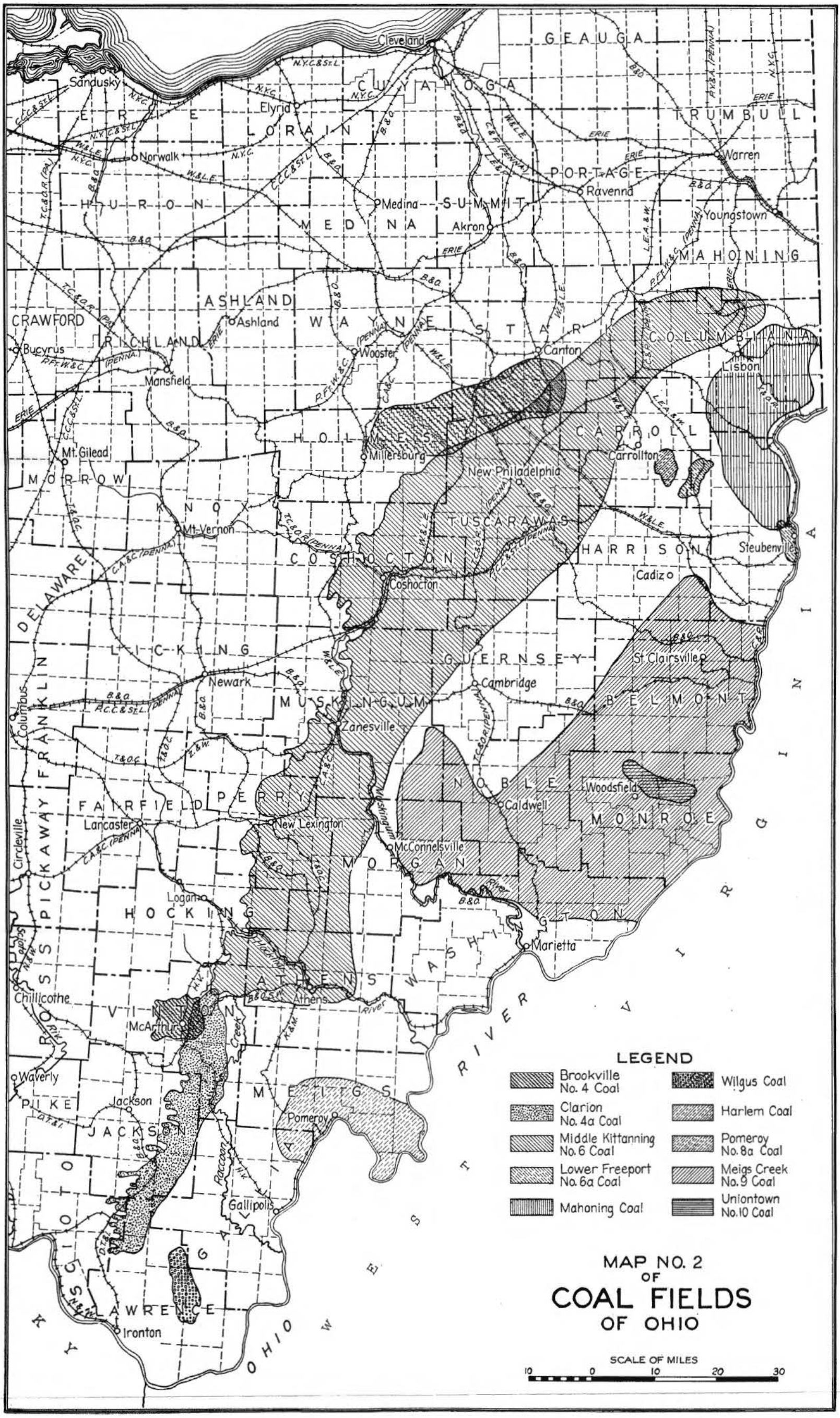
Proximate analysis

	As received	Moisture free
Moisture	5.29	0.00
Volatile matter	42.26	44.62
Fixed carbon	48.67	51.38
Ash	3.78	4.00
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.55	76.60
Hydrogen	5.62	5.31
Nitrogen	1.08	1.14
Oxygen	16.21	12.16
Sulphur	0.76	0.79
Ash	3.78	4.00
	100.00	100.00

Air drying loss 0.62 per cent



MAP NO. 2
OF
COAL FIELDS
OF OHIO

SCALE OF MILES
10 0 10 20 30

		As received	Moisture free
Heating value	Calories	7,152	7,552
	B. t. u.	12,874	13,593
Fusion of ash	Incipient	2,080°F.	
	Complete	2,201°F.	

This is a wagon mine with a capacity in 1926 of from 100 to 125 tons per day.

Jackson field

The Jackson field of the Sharon or No. 1 coal lies in the southern part of Ohio, where the coal is known as the Jackson Shaft. It is named from Jackson in Jackson County where it was discovered in 1863. It has long been used in making iron, the present practice being one part of this fuel to two parts of Pocahontas coke.

The coal outcrops in the valley of Salt Creek at Jackson but to the south it falls below drainage. This fuel is found in the hills and ridges of Liberty and Jackson townships and to a lesser extent in the northwest corner of Scioto Township, and also in the high ridges and hills in the eastern part of Pike County. Stout estimates the area of Sharon coal in Jackson County at 25 square miles but thinks that 50 per cent of this is not workable. The coal is now mined and used by two furnaces at Jackson and by farmers.

The three railroad mines are all on the Detroit, Toledo, and Ironton Railroad and two to three miles west of Jackson. Each mine has a capacity of about 100 tons per day. All have been idle for approximately three years, (1925–1927).

The coal is strong and hence mines with much lump. It is non-coking and burns with a short flame. Sulphur is low and seldom exceeds one per cent; the ash is variable; and the moisture high. The thickness of the bed varies from 2 to 4 feet. The coal was at its best in thickness and quality under the city of Jackson but this has been almost wholly worked out. Commonly the bed has an uneven floor and hence varies much and quickly in thickness.

Sections and analyses

Sample of Sharon coal from Decatur mine No. 1 of the Jackson Decatur Coal Co., Section 28, Liberty Township, Jackson County, Sampled by K. M. Way in 1907. Analysis is by the United States Bureau of Mines.[1]

Sample taken 650 feet northwest of opening.

	Ft.	In.
Shale, unmeasured.		
Coal, sampled, *Sharon*	3	¾
Clay floor.		

[1]U. S. Bureau of Mines, Bull. 22, pp. 146, 667.

Proximate analysis

	As received	Moisture free
Moisture	13.60	0.00
Volatile matter	31.75	36.74
Fixed carbon	50.42	58.36
Ash	4.23	4.90
	100.00	100.00
Sulphur	0.86	0.99
Air drying loss 3.2 per cent		
Heating value — Calories	6,491	7,513
Heating value — B. t. u.	11,684	13,523

Sample taken from same mine 600 feet northwest of opening.

	Ft.	In.
Shale, unmeasured.		
Coal, sampled, *Sharon*	2	9¾
Clay floor.		

Proximate analysis

	As received	Moisture free
Moisture	12.77	0.00
Volatile matter	31.51	36.12
Fixed carbon	47.94	54.96
Ash	7.78	8.92
	100.00	100.00
Sulphur	0.97	1.11
Air drying loss 2.8 per cent		
Heating value — Calories	6,259	7,175
Heating value — B. t. u.	11,266	12,915

Sample of Sharon coal from the Jisco mine of the Jackson Iron and Steel Co., northwest quarter of Section 31, Lick Township, Jackson County. Depth of shaft 50 feet. Sample cut in 1925 by P. R. Maxey and T. R. Meyers. Analysis by D. J. Demorest.

	Ft.	In.
Shale roof.		
Coal, good, sampled, *Sharon*	2	2½
Bone coal and shale, rejected		4
Conglomerate.		

The coal showed no sulphur or pyrite bands. Its thickness ranges from 2 to 3 feet with an average of 2 feet 2 inches, according to the mine superintendent. The section cut for sampling was 12 inches wide and 4 inches deep.

Proximate analysis

	As received	Moisture free
Moisture	10.75	0.00
Volatile matter	35.38	39.64
Fixed carbon	48.88	54.77
Ash	4.99	5.59
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.97	76.16
Hydrogen	5.33	4.64
Nitrogen	1.42	1.59
Oxygen	19.82	11.49
Sulphur	0.47	0.53
Ash	4.99	5.59
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,496	7,278
	B. t. u.	11,692	13,100

Fusion of ash	Incipient	2,746°F.
	Complete	2,799°F.

Sample of Sharon coal from the mine of the Globe Iron Co., east-central Section 28, Lick Township, Jackson County. Depth of shaft 50 feet. Sample 12 inches wide and 4 inches deep. Sample cut in 1925 by P. R. Maxey and T. R. Meyers. Analysis by D. J. Demorest.

		Ft.	In.
Shale.			
Coal, bony, rejected	*Sharon*	3	1
Coal, sampled			3½
Coal, bony, rejected			4
Shale.			

Proximate analysis

	As received	Moisture free
Moisture	11.58	0.00
Volatile matter	33.03	37.36
Fixed carbon	48.74	55.12
Ash	6.65	7.52
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.25	74.93
Hydrogen	5.27	4.50
Nitrogen	1.30	1.47
Oxygen	20.06	11.05
Sulphur	0.47	0.53
Ash	6.65	7.52
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,337	7,167
	B. t. u.	11,407	12,901

Fusion of ash	Incipient	2,939°F.
	Complete	3,007°F.

ANTHONY COAL

The Anthony coal lies nearly midway between the Sharon or No. 1 and the Quakertown or No. 2 bed. It is best developed in southern Ohio but even there rarely attains a thickness of 1 foot. In places it is shaly and hence impure, whereas elsewhere it is of good quality. The coal has been mined in a very small way for domestic purposes by stripping and benching, and also in clay mines where the coal forms the roof.

HUCKLEBERRY COAL

The Huckleberry coal lies a few feet above the Anthony in southern Ohio. It is very thin and patchy and where present has little or no value.

QUAKERTOWN OR No. 2 COAL

The Quakertown or No. 2 is the second important coal bed in the rock column of Ohio. Its position with reference to the Sharon or No. 1 bed is shown in the following record from Section 18, Lick Township, Jackson County:

	Ft.	In.
Coal, *Quakertown*, reported thickness	2	6
Covered	24	0
Sandstone, massive	33	0
Covered	5	0
Shale, part covered	22	0
Coal, *Sharon*, reported thickness	2	8

Although this section makes the interval between the two coals 84 feet, it is, according to Stout, in most places 60 to 80 feet. The bed can be traced from Mahoning County on the Pennsylvania line southwest across Ohio to Jackson County, where the coal is at its best. However, from Mahoning to Vinton County the coal is everywhere thin or wanting, and nowhere of value as a source of fuel except in a small way for domestic purposes.

The one important deposit of the Quakertown coal in Ohio is in northern Jackson County where it was discovered in 1872 by H. S. Bundy in searching for the Sharon or Jackson Shaft coal. The Quakertown coal is there known as the Wellston, Jackson Hill, or Elk Fork coal.[1]

Wellston field

The Wellston field of the Quakertown coal had, when mining began, an area of about 40 square miles. It included parts of Coal, Milton, and Washington townships, Jackson County.

The best of the deposit was near Wellston where the bed measured

[1]For details concerning the Quakertown coal in Jackson County see Stout, W., Geol. Survey Ohio, Bull. 20, pp. 90–114.

about 3 feet in thickness. For 35 years efforts have been made with the drill to extend the field eastward along the margin of Jackson County and into Vinton, but although small patches of minable coal have been found the results on the whole have not been favorable.

For many years the production of Wellston coal was large and made Jackson County for a time the largest producer in Ohio. The maximum, 2,412,509 tons, was reached in 1902 and since that year the output has notably declined. Now the Wellston coal has become almost a thing of the past. In the heart of the old field pillars are being removed and patches for various reasons left unmined are now being worked. Along the margins of the field in eastern Milton Township are small deposits of thin coal and these form the basis of the chief mining operations at present.

The Wellston coal is rather tender and hence does not stand mining and transportation well. It has a bright luster and is very free from shale or clay partings except near the floor and roof. Sulphur and ash are low. The coal is non-coking. It burns with a long, steady flame and makes very little soot. For domestic purposes it is the best of Ohio coals.

Small deposits of Quakertown coal occur in Vinton County, the best apparently in Elk Township where it has been mined for railroad shipment since 1900. The bed has a maximum thickness of 4 feet but is unsteady. Probably other deposits of this bed in Vinton County will be mined in the future for shipment or for use in burning ceramic wares.[1]

Sections and analyses

Sample of Quakertown (Wellston) coal from the Pritchard and Poole (Old Central) mine in west central Section 34, Coal Township, Jackson County. Sample 12 by 4 inches, cut in 1925 by P. R. Maxey and T. R. Meyers. Analysis by D. J. Demorest. This sample represents the best of the Wellston coal.

	Ft	In.
Shale, roof.		
Shale, draw slate, rejected		1
Coal, sampled, *Quakertown*	1	11½
Shale floor.		

The lower 2½ inches of coal was slightly bony but was included in sample.

[1]For details concerning the Quakertown coal in Vinton County, see Stout, W., Geol. Survey Ohio, Bull. 31, pp. 81–93.

Proximate analysis

	As received	Moisture free
Moisture	11.28	0.00
Volatile matter	36.41	41.04
Fixed carbon	50.64	57.08
Ash	1.67	1.88
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.52	79.49
Hydrogen	5.58	4.88
Nitrogen	1.39	1.57
Oxygen	20.20	11.46
Sulphur	.64	.72
Ash	1.67	1.88
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,762	7,622
	B. t. u.	12,171	13,719

Fusion of ash	Incipient	2,707°F.
	Complete	2,786°F.

Sample of Quakertown (Wellston) coal from the No. 12 mine of the Superior Colliery Co., northeast Section 33, Milton Township, Jackson County. Sample 12 by 4 inches, cut in 1925 by P. R. Maxey and T. R. Meyers. Analysis by D. J. Demorest. Depth of shaft about 150 feet.

		Ft.	In.
Shale roof.			
Coal, bony, rejected	*Quakertown*	2	2¼
Coal, sampled			3½
Coal, bony, rejected			2
Shale floor.			

Proximate analysis

	As received	Moisture free
Moisture	9.74	0.00
Volatile matter	35.50	39.33
Fixed carbon	49.24	54.55
Ash	5.52	6.12
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.54	74.83
Hydrogen	5.36	4.74
Nitrogen	1.43	1.58
Oxygen	18.87	11.31
Sulphur	1.28	1.42
Ash	5.52	6.12
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,553	7,260
	B. t. u.	11,796	13,069

Fusion of ash	Incipient	2,746°F.
	Complete	2,811°F.

When sampled in 1925 this mine was producing from 400 to 700 tons per day.

Sample of Quakertown (Wellston) coal from the Wainright mine, Maynard Coal Co., northeast Section 4, Milton Township, Jackson County. Sampled in 1914 by W. Stout, analyst E. E. Somermeier.

	Ft.	In.
Shale, siliceous, good roof	10	0
Coal, good, no partings, sampled, *Quakertown*	2	4
Clay, siliceous, hard	2	0

Proximate analysis

	As received	Moisture free
Moisture	9.29	0.00
Volatile matter	32.96	36.33
Fixed carbon	54.26	59.82
Ash	3.49	3.85
	100.00	100.00
Sulphur	1.25	1.38
Nitrogen	1.39	1.53
Heating value..... Calories	6,960	7,673
Heating value..... B. t. u.	12,528	13,811

Sample of Quakertown (Wellston) coal from the P. V. Gorsuch mine on John Bancroft farm in southeast Section 8, Elk Township, Vinton County. Sample 12 inches wide and 4 inches deep, cut in 1925 by W. Stout, P. R. Maxey, and T. R. Meyers. Analysis by D. J. Demorest.

		Ft.	In.
Shale roof.			
Coal, cannel, pyritic, sampled	*Quakertown*		½
Coal, canneloid, sampled	*Quakertown*		5
Coal, hard, bright, sampled	*Quakertown*		10¼
Coal, softer, sampled	*Quakertown*	1	8½
Clay, hard, siliceous		1	0

Proximate analysis

	As received	Moisture free
Moisture	11.12	0.00
Volatile matter	36.90	41.52
Fixed carbon	46.42	52.22
Ash	5.56	6.26
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.34	75.77
Hydrogen	5.75	5.09
Nitrogen	1.52	1.71
Oxygen	19.25	10.52
Sulphur	.58	.65
Ash	5.56	6.26
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,623	7,452
	B. t. u.	11,921	13,413

Fusion of ash	Incipient	2,655°F.
	Complete	2,728°F.

This is a small drift mine, supplying coal by wagon to McArthur.

Sample of Quakertown (Wellston) coal cut in 1925 by W. Stout, P. R. Maxey, and T. R. Meyers from the C. C. Dozer mine, northeast Section 25, Harrison Township, Vinton County. Sample 12 inches wide and 4 inches deep. Analysis by D. J. Demorest.

	Ft.	In.
Shale roof.		
Coal, sampled, *Quakertown*	2	1¼
Clay, hard, siliceous.		

No shale or clay partings or pyrite bands were present.

Proximate analysis

	As received	Moisture free
Moisture	11.38	0.00
Volatile matter	38.79	43.77
Fixed carbon	45.73	51.60
Ash	4.10	4.63
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.35	76.00
Hydrogen	5.78	5.10
Nitrogen	1.52	1.72
Oxygen	20.39	11.58
Sulphur	.86	.97
Ash	4.10	4.63
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,553	7,394
	B. t. u.	11,795	13,310

Fusion of ash	Incipient	2,557°F.
	Complete	2,629°F.

This is a country mine, the coal being hauled by wagon.

Central Ohio field

Sections and analyses

Sample of Quakertown coal cut in 1917 by W. Stout and R. E. Lamborn in the mine of Henry Norman two miles northwest of Frazeysburg, Section 8, Jackson Township, Muskingum County. The mine

was wet and hence the sample was high in moisture. Analysis by D. J. Demorest.

		Ft.	In.
Shale		5	0
Coal, sampled	*Quakertown*		6½
Shale, rejected	*Quakertown*		½
Coal, sampled	*Quakertown*	1	1
Clay, siliceous		2	0

Proximate analysis

	As received	Moisture free
Moisture	9.80	0.00
Volatile matter	35.12	38.94
Fixed carbon	49.10	54.43
Ash	5.98	6.63
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.78	76.25
Hydrogen	5.79	5.21
Nitrogen	1.21	1.34
Oxygen	16.87	9.05
Sulphur	1.37	1.52
Ash	5.98	6.63
	100.00	100.00

Air drying loss 3.2 per cent

		As received	Moisture free
Heating value	Calories	6,745	7,478
	B. t. u.	12,141	13,460

Fusion of ash	Incipient	2,057°F.
	Complete	2,660°F.

Sample of Quakertown (Wellston) coal taken in 1928 by W. S. Glock and L. O. Naffziger from mine of A. R. Mackey one mile northwest of Welcome in the southwest part of central Monroe Township, Holmes County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, roof.			
Coal, shaly, rejected	*Quakertown*		2
Coal, sampled	*Quakertown*		9
Shale, gray, soft, rejected	*Quakertown*		1
Coal, sampled	*Quakertown*	1	5¼
Shale, gray, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.43	0.00
Volatile matter	40.69	43.48
Fixed carbon	46.84	50.06
Ash	6.04	6.46
	100.00	100.00
Sulphur	2.48	2.65

Air drying loss 1.80 per cent

		As received	Moisture free
Heating value	Calories	7,024	7,506
	B. t. u.	12,643	13,511
Fusion of ash	Incipient	2,152°F.	
	Complete	2,374°F.	

BEAR RUN COAL

The Bear Run coal lies from 15 to 30 feet above the Quakertown coal. Although lacking in continuity the bed is recognized at many places in southern Ohio. It varies in thickness from a few inches to more than 2 feet and in character from pure to shaly coal.[1] It is mined in a few places by farmers, but nowhere for shipment.

Sample of Bear Run coal taken in 1928 by W. S. Glock and L. O. Naffziger from the mine of Charles Henning in northwest Section 3, on Bear Run, Bloom Township, Scioto County. Analysis by D. J. Demorest. Sample moist.

		Ft	In.
Shale, roof.			
Coal, shaly, rejected	*Bear Run*		3¼
Coal, bony, rejected			2
Coal, sampled		1	1¾
Coal, bony, rejected			10¾

Proximate analysis

	As received	Moisture free
Moisture	10.44	0.00
Volatile matter	36.20	40.42
Fixed carbon	44.84	50.07
Ash	8.52	9.51
	100.00	100.00
Sulphur	1.03	1.15

Air drying loss 2.53 per cent

Heating value	Calories	6,352	7,092
	B. t. u.	11,434	12,767
Fusion of ash	Incipient	2,635°F.	
	Complete	2,713°F.	

VANDUSEN COAL

The Vandusen coal, like the Bear Run, is thin and patchy. It extends as far north at least as Muskingum County but rarely attains a thickness of 2 feet in this State. The coal is reported to be of good quality but it is nowhere mined except by farmers for a local supply.

LOWER MERCER OR No. 3 COAL

The Lower Mercer coal can be traced from Mahoning County on the State line southwest to the Ohio River. However, it is nowhere a

[1]Stout, W., Geol. Survey Ohio, Bull. 31, p. 95.

large source of fuel. At its best it measures 4 feet in thickness but in most places it is less than 1 foot. The largest deposits are at the two ends of the outcrop in Ohio, that is in Mahoning County to the northeast and in Vinton, Jackson, Scioto, and Lawrence counties to the south. At a few places it is stripped by farmers for domestic purposes.

The following section shows the position of this coal with reference to several higher members:[1]

		Ft.	In.
Coal blossom, *Upper Mercer*			8
Clay, light		1	4
Shale, sandy		4	10
Ore, irregular, kidney			2
Sandstone, shaly		11	0
Shale and covered		8	0
Clay shale, light and pink		6	0
Shale and covered		6	6
Ore, kidney			3
Shale	*Lower Mercer*	1	0
Ore, kidney			10
Shale, very fossiliferous		1	6
Shale, gray	*Lower Mercer*	2	1
Limestone, fossiliferous, blue			10
Clay shale		2	0
Coal blossom, *Flint Ridge*			2
Sandstone, shaly, covered		14	0
Ore, irregular, kidney, *Boggs*			6
Shale and shaly sandstone		3	0
Sandstone			3
Coal, *Lower Mercer*		1	1

FLINT RIDGE COAL

The Flint Ridge coal is named from Flint Ridge, Licking County, where it is a cannel and where it is mined in a small way for local use. The following section was measured by Stout in west central Hopewell Township:

		Ft.	In.
Limestone, shaly, dark, fossiliferous		8	9
Shale, calcareous	*Lower Mercer*		3
Limestone, hard, blue, fossiliferous		1	4
Limestone, shaly, fossiliferous			6
Coal, bituminous, *Middle Mercer*			8
Shale, black			10
Clay shale, light, argillaceous		4	0
Coal, bony			10
Clay, dark			8
Coal, cannel	*Flint Ridge*	3	9
Shale, argillaceous		1	4
Coal, cannel			10
Clay shale, siliceous		4	0

[1]Stout, W., Geol. Survey Ohio, Bull. 31, p. 107.

The coal has a maximum thickness of 5 feet. It is a good fuel for grates, and was formerly distilled for petroleum, the yield being 40 gallons of crude oil per ton. Unfortunately the area of mining thickness is only 2 or 3 square miles. Elsewhere in Ohio the coal is thin, rarely exceeding 1 foot.

MIDDLE MERCER COAL

The position of the Middle Mercer coal in the rock column is shown in the preceding section. The bed can be traced across the State but in most places it is too thin for mining. Near East Greenville, Stark County, it measures 3 feet 6 inches and is reached by a shaft 60 feet deep. The area of this deposit, however, is small.

Sample of Middle Mercer coal from Mine No. 1 of the Betty Coal Co., southwest Section 8, Tuscarawas Township, Stark County. Sample cut in 1926 by T. R. Meyers and G. W. White. Analysis by D. J. Demorest.

		Ft.	In.
Limestone, *Lower Mercer.*			
Shale, coaly, rejected			3
Coal, somewhat bony, sampled	*Middle Mercer*		9
Coal, sampled	*Middle Mercer*	2	8
Clay shale floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.54	0.00
Volatile matter	40.38	41.86
Fixed carbon	42.35	43.91
Ash	13.73	14.23
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.82	66.17
Hydrogen	5.17	4.94
Nitrogen	.87	.90
Oxygen	13.96	11.22
Sulphur	2.45	2.54
Ash	13.73	14.23
	100.00	100.00

Air drying loss 0.68 per cent

		As received	Moisture free
Heating value	Calories	6,401	6,636
	B. t. u.	11,521	11,944

Fusion of ash	Incipient	2,554°F.
	Complete	2,683°F.

UPPER MERCER, WEBSTER BLOCK, OR No. 3a COAL

The main field of Upper Mercer or Webster Block coal is in western Lawrence, eastern Scioto, and southern Jackson counties. North of this the bed is thin or wanting. The position of the member is about midway in the interval between the Lower Mercer or Little Red Block

and the Upper Mercer or Big Red Block ores which represent the Mercer horizons in the absence of the limestone. This interval varies from 30 to 50 feet but averages about 40 feet. Further, the coal lies only a few feet below the Sand Block ore where this member is present. Although thin the Upper Mercer coal is generally of excellent quality and is especially well liked for domestic purposes. It is a free-burning fuel tending towards the cannel type. The ash and sulphur are generally low and not given to clinkering.

Sections and analyses

Sample of Upper Mercer coal taken in 1928 by W. S. Glock and L. O. Naffziger from the mine of F. M. Kiser in the southwest quarter of Section 9, Hamilton Township, Lawrence County. Analysis by D. J. Demorest. Sample moist.

		Ft.	In.
Sandstone roof.			
Coal, sampled	*Upper Mercer*	1	1¾
Coal, bony, rejected	*Upper Mercer*		1½
Clay, rejected	*Upper Mercer*		4½
Coal, sampled	*Upper Mercer*		5
Clay floor.			

Proximate analysis

	As received	Moisture free
Moisture	7.17	0.00
Volatile matter	42.50	45.78
Fixed carbon	39.67	42.74
Ash	10.66	11.48
	100.00	100.00
Sulphur	3.54	3.81

Air drying loss 3.66 per cent

Heating value	Calories	6,554	7,060
	B. t. u.	11,798	12,709

Fusion of ash	Incipient	2,170°F.
	Complete	2,402°F.

Sample of Upper Mercer or Webster Block coal taken in 1928 by W. S. Glock and L. O. Naffziger from the mine of J. W. Mossbarger, in the northeast quarter of Section 22, Bloom Township, Scioto County. Analysis by D. J. Demorest. Sample moist.

		Ft.	In.
Sandstone roof.			
Coal, sampled	*Webster Block*	1	2⅞
Clay, rejected			6¾
Coal, bony, rejected			2¼
Clay, rejected		1	3¾
Coal, bony, rejected			4½
Coal, rejected			7
Shale floor.			

Proximate analysis

	As received	Moisture free
Moisture	10.22	0.00
Volatile matter	40.82	45.46
Fixed carbon	45.69	50.90
Ash	3.27	3.64
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.28	77.16
Hydrogen	5.39	4.73
Oxygen	19.62	11.76
Nitrogen	1.53	1.70
Sulphur	0.91	1.01
Ash	3.27	3.64
	100.00	100.00

Air drying loss 2.64 per cent

		As received	Moisture free
Heating value	Calories	6,894	7,679
	B. t. u.	12,409	13,822

Fusion of ash: Incipient 2,444°F.; Complete 2,500°F.

Sample of Upper Mercer coal taken in 1928 by W. S. Glock and L. O. Naffziger from the mine of T. S. Jones in south central Section 8, Jefferson Township, Jackson County. Analysis by D. J. Demorest.

		Ft.	In
Shale, gray, roof.			
Coal, sampled	*Upper Mercer*	1	9½
Coal, bony, rejected			½
Clay floor.			

Proximate analysis

	As received	Moisture free
Moisture	9.51	0.00
Volatile matter	38.98	43.07
Fixed carbon	46.81	51.74
Ash	4.70	5.19
	100.00	100.00
Sulphur	1.06	1.17

Air drying loss 1.84 per cent

		As received	Moisture free
Heating value	Calories	6,752	7,462
	B. t. u.	12,154	13,431
Fusion of ash	Incipient	2,514°F.	
	Complete	2,550°F.	

BEDFORD COAL

As shown in a later section, the Bedford coal is due just below the Upper Mercer limestone, and while the coal can be traced across the State, it is of value in but few places. The best deposit is in Bedford and Jefferson townships, Coshocton County, where the coal is reported to have a maximum thickness of 9 feet and to be in part cannel.

Sections and analyses

Sample of Bedford coal from the Max Frazier farm in the northeast corner of Licking Township, three-fourths mile northwest of Shannon, Muskingum County. Sample cut in 1917 by W. Stout and R. E. Lamborn. Analysis by D. J. Demorest.

		Ft.	In.
Flint, black, *Upper Mercer*			6
Shale			1
Coal, good, sampled	*Bedford*		3
Clay shale, rejected	*Bedford*		3
Coal, bony, rejected	*Bedford*		2½
Coal, good, sampled	*Bedford*	2	2
Clay, plastic		2	0

Proximate analysis

	As received	Moisture free
Moisture	5.56	0.00
Volatile matter	39.49	41.81
Fixed carbon	44.93	47.58
Ash	10.02	10.61
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.35	71.31
Hydrogen	5.32	4.98
Nitrogen	1.25	1.32
Oxygen	13.24	8.79
Sulphur	2.82	2.99
Ash	10.02	10.61
	100.00	100.00

Air drying loss 1.60 per cent

		As received	Moisture free
Heating value	Calories	6,719	7,114
	B. t. u.	12,094	12,805
Fusion of ash	Incipient	2,199°F.	
	Complete	2,660°F.	

Sample of Bedford coal from Woodbury Estate mine, in hollow one-half mile north of the tunnel of the Pennsylvania Railroad, north central Bedford Township, Coshocton County. Sample cut in 1926 by T. R. Meyers and G. W. White. Analysis by D. J. Demorest.

		Ft.	In.
Shale roof.			
Coal, not used			1 - 4
Shale, dark, full of pyrite			2½
Coal, bituminous, canneloid	*Bedford*	2	0
Clay, carbon			½
Coal, cannel, laminated, not taken		1	0
Coal, cannel, sampled		2	6
Clay floor.			

In this mine only the curly cannel coal was sampled.

The capacity is about 50 tons per day, New York City being the principal market.

Proximate analysis

	As received	Moisture free
Moisture	1.54	0.00
Volatile matter	46.57	47.29
Fixed carbon	35.42	35.97
Ash	16.47	16.74
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.63	65.61
Hydrogen	4.95	4.86
Nitrogen	1.67	1.70
Oxygen	8.54	7.29
Sulphur	3.74	3.80
Ash	16.47	16.74
	100.00	100.00

Air drying loss 0.23 per cent

		As received	Moisture free
Heating value	Calories	6,591	6,694
	B. t. u.	11,864	12,049

Fusion of ash	Incipient	2,240°F.
	Complete	2,354°F.

Another workable deposit of Bedford coal lies in northeast Killbuck, northwest Mechanic, and southwest Hardy townships, Holmes County. The coal varies from 1 to 7 feet in thickness and is mostly cannel. Formerly the bed was mined for shipment but at present it is worked only for local trade.

Sample of Bedford coal taken in 1928 by W. S. Glock and L. O.

Naffziger from mine of C. E. Zehnder, in central Section 1, Prairie Township, Holmes County. Analysis by D. J. Demorest.

		Ft.	In.
Limestone.			
Coal, bony and shaly, roof			6
Coal, sampled	*Bedford*		2½
Coal, bony, rejected			1
Coal, sampled			2¾
Coal, bony, rejected			1⅞
Coal, sampled		2	1
Shale, gray, floor.			

Proximate analysis

	As received	Moisture free
Moisture	8.02	0.00
Volatile matter	40.97	44.54
Fixed carbon	44.93	48.85
Ash	6.08	6.61
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.58	73.47
Hydrogen	5.00	4.47
Oxygen	17.40	11.17
Nitrogen	1.41	1.53
Sulphur	2.53	2.75
Ash	6.08	6.61
	100.00	100.00

Air drying loss 3.62 per cent

		As received	Moisture free
Heating value	Calories	6,837	7,433
	B. t. u.	12,306	13,379

Fusion of ash	Incipient	2,116°F.
	Complete	2,374°F.

TIONESTA OR No. 3b COAL

This is the highest coal bed of the Pottsville series and it has the least value of any of the important beds. In Lawrence Township, Tuscarawas County, a small deposit of this bed is known as the Bolivar coal and has been worked off and on for many years by farmers for a domestic supply. Following is a section measured at Bolivar by Orton:[1]

		Ft.	In.
Shale, dark.			
Coal, slaty	*Bolivar*	2	0
Clay and coal streaks		1	0
Coal		2	0

[1]Geol. Survey Ohio, Vol. V, p. 259.

The Tionesta coal has been reported by Stout at various places in Muskingum County but it rarely attains a thickness of 2 feet and therefore has very little value.[1] The coal is at its best in Wayne Township where it has long been mined by farmers in an irregular way for local use. The bed commonly ranges from 1 foot 8 inches to 2 feet 6 inches in thickness.

Sample of Tionesta coal cut in 1917 by W. Stout and R. E. Lamborn from an exposure in a stream bed on the Richardson property in Salt Gum Hollow, Wayne Township, Muskingum County. Sample 12 by 5 inches. Analysis by D. J. Demorest.

	Ft.	In.
Shale, gray, siliceous	5	0
Coal, sampled, *Tionesta*	2	5
Shale, bony		2
Clay, siliceous	3	0

Proximate analysis

	As received	Moisture free
Moisture	8.50	0.00
Volatile matter	36.44	39.83
Fixed carbon	45.89	50.15
Ash	9.17	10.02
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.31	71.38
Hydrogen	5.49	4.97
Nitrogen	1.13	1.23
Oxygen	17.60	10.98
Sulphur	1.30	1.42
Ash	9.17	10.02
	100.00	100.00

Air drying loss 4 per cent

		As received	Moisture free
Heating value	Calories	6,511	7,116
	B. t. u.	11,720	12,809

Ash very refractory, not softened at 2,732°F.

ALLEGHENY SERIES

The Allegheny series lies directly above the Pottsville, and extends as a broad belt across the State from Mahoning and Columbiana counties southwest to Scioto and Lawrence. According to Stout, it has an area of about 2,600 square miles and a thickness of from 175 to 280 feet. The Brookville or No. 4 coal bed forms the base of the series and the

[1]Geol. Survey Ohio, Bulletin 21, pp. 115–121.

Upper Freeport or No. 7 the top. Stout lists 13 coal beds in the series, the names and sequence being as follows:

Upper Freeport or No. 7 coal
Unnamed coal. Bolivat clay horizon
Lower Freeport or No. 6a coal
Upper Kittanning coal
Middle Kittanning or No. 6 coal
Strasburg coal
Lower Kittanning or No. 5 coal
Lawrence coal
Scrubgrass coal
Clarion or No. 4a coal
Winters coal
Ogan coal
Brookville or No. 4 coal

Seven of these have been mined for railroad shipment, and all the others except the Upper Kittanning and the unnamed bed have been worked for a local fuel supply.

BROOKVILLE OR No. 4 COAL

The Brookville coal bed, which forms the base of the Allegheny series, extends from the Ohio-Pennsylvania State line southwest to Kentucky. However, it is very patchy and of minable thickness in only a few places. The position of the Brookville coal with reference to several higher members is shown in the following section from Vinton County:

	Ft.	In.
Coal blossom, *Clarion*	2	0
Clay and covered	6	0
Shale, gray	19	0
Coal, *Winters*	2	7
Clay shale	2	4
Coal, shaly		1
Clay, plastic		7
Flint, gray to black, *Zaleski*	2	11
Coal, *Ogan*	3	3
Clay, light, plastic	5	0
Ore, kidney		2
Shale, gray	10	10
Shale, gray, fossiliferous, *Putnam Hill*	3	0
Coal, *Brookville*	3	2

The Brookville coal lies just below the Putnam Hill limestone and for that reason it is easily identified. The coal is at its best in Stark County, where it is an important local source of fuel. The bed extends across the county from north to south but it has not been accurately mapped. The largest mines are only a mile or two north of Canton

and the coal is trucked to that city. The fuel has been mined at Howenstein south of Canton where it was used in burning lime.

Sections and analyses

Sample of Brookville coal from Fox Run mine, E. P. Wynn Coal Co., northwest Section 35, Canton Township, Stark County. Sample cut in 1926 by T. R. Meyers and G. W. White. Analysis by D. J. Demorest.

		Ft.	In.
Limestone, *Putnam Hill.*			
Shale			1
Coal, good, sampled	*Brookville*		7
Shale, gray and hard, rejected			1½
Coal, good, sampled		1	7
Shale, gray and hard, rejected			2½
Coal, bony, rejected			3½
Coal, good, sampled			11
Pyrite, sampled			⅛
Coal, good, sampled			7
Coal, bottom, rejected			

Proximate analysis

	As received	Moisture free
Moisture	5.18	0.00
Volatile matter	39.90	42.09
Fixed carbon	43.62	46.01
Ash	11.30	11.90
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.29	68.88
Hydrogen	5.21	4.90
Oxygen	13.39	9.24
Nitrogen	1.19	1.26
Sulphur	3.62	3.82
Ash	11.30	11.90
	100.00	100.00

Air drying loss 2.06 per cent

		As received	Moisture free
Heating value	Calories	6,593	6,953
	B. t. u.	11,867	12,515

Fusion of ash	Incipient	2,544°F.
	Complete	2,668°F.

This is a railroad shipping mine with a capacity of 400 tons per day.

In Wayne County the Brookville coal is found in four townships in the southeast part of the county where according to Conrey the coal averages 2 feet 4 inches in thickness with a maximum of 3 feet.

Sample of Brookville coal taken from mine of the Monroeville Clay Products Co., southwest Section 24, Franklin Township, Wayne County. Sample cut in 1926 by T. R. Meyers and G. W. White. Analysis by D. J. Demorest.

		Ft.	In.
Limestone, *Putnam Hill.*			
Shale, calcareous			½
Coal, sampled	*Brookville*		6½
Shale, rejected			¼
Coal, sampled			2¾
Mother coal, sampled			¼
Coal, sampled			3½
Shale, dark, rejected			2½
Coal, sampled		1	5¼
Shale, black, sampled			¼
Coal, sampled			3½
Clay		4	0

Proximate analysis

	As received	Moisture free
Moisture	6.81	0.00
Volatile matter	42.64	45.76
Fixed carbon	40.54	43.50
Ash	10.01	10.74
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.53	69.24
Hydrogen	5.55	5.14
Oxygen	15.87	10.55
Nitrogen	.76	.81
Sulphur	3.28	3.52
Ash	10.01	10.74
	100.00	100.00

Air drying loss 2.03 per cent

		As received	Moisture free
Heating value	Calories	6,548	7,027
	B. t. u.	11,787	12,649

Fusion of ash	Incipient	2,300°F.
	Complete	2,399°F.

Capacity of mine, about 25 tons per day.

The Brookville coal is of minable thickness in small areas in Tuscarawas, Coshocton, and Holmes counties in northern Ohio, and to a large extent in Vinton County in the southeast part of the State, where it is known as the Newland coal and averages 2 feet 5 inches in thickness with a maximum of 7 feet.

Sample of Brookville (Newland) coal cut in 1922 by W. Stout in the F. L. King mine on land of Harvey Alkire, west central Section 2, Elk Township, Vinton County.[1] Analysis by D. J. Demorest.

[1]Stout, W., Geol. Survey Ohio, Bull. 31, pp. 164, 169.

		Ft.	In.
Shale, fossiliferous, *Putnam Hill*		3	0
Coal, sampled	*Brookville*		5
Coal, bony, rejected			3
Clay shale, rejected			1½
Coal, sampled			6
Clay, plastic, rejected			5
Coal, sampled			1½
Coal, splint, sampled			4½
Clay parting, rejected			½
Coal, sampled			7
Pyrite, sampled			¼
Coal, sampled			8
Coal, splint, sampled			7
Coal, sampled		1	2
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	6.08	0.00
Volatile matter	36.75	39.13
Fixed carbon	44.77	47.67
Ash	12.40	13.20
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.45	70.75
Hydrogen	4.83	4.42
Oxygen	13.51	8.64
Nitrogen	1.16	1.23
Sulphur	1.65	1.76
Ash	12.40	13.20
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,460	6,878
	B. t. u.	11,628	12,381

Fusion of ash—Incipient above 2,650°F.

Sample of Brookville (Newland) coal taken from the Samuel Noble mine, Section 17, Elk Township, Vinton County. This was formerly the Newland land, hence the name Newland coal. Sample cut by W. Stout in 1922.[1] Analysis by D. J. Demorest.

		Ft.	In.
Shale, *Putnam Hill*		2	0
Coal, sampled	*Brookville*		8
Coal, bony, sampled			2
Clay, rejected			6
Coal, sampled		1	0
Coal, hard, sampled			8
Coal, sampled		1	2
Shale and mother coal, sampled			¼
Coal, sampled		1	3½

[1]Stout, W., Geol. Survey Ohio, Bull. 31, pp. 166, 169.

Proximate analysis

	As received	Moisture free
Moisture	6.95	0.00
Volatile matter	38.49	41.36
Fixed carbon	45.81	49.24
Ash	8.75	9.40
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.03	73.11
Hydrogen	4.94	4.48
Oxygen	15.21	9.71
Nitrogen	1.23	1.32
Sulphur	1.84	1.98
Ash	8.75	9.40
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,683	7,183
	B. t. u.	12,031	12,930

Fusion of ash—Incipient above 2,650°F.

Sample of Brookville (Newland) coal taken from the mine of the Mohio Coal and Mining Co., northwest quarter of Section 32, Madison Township, Vinton County.[1] Sample cut by W. Stout in 1922. Analysis by D. J. Demorest.

		Ft.	In.
Shale, fossiliferous, *Putnam Hill*		3	6
Coal, sampled	*Brookville*		8
Pyrite, rejected			1
Coal, sampled			5
Clay, rejected			5
Coal, sampled			10
Coal, hard, sampled			9
Coal, sampled			7
Coal, hard, sampled			1
Coal, sampled			9
Shale, bony, sampled			¾
Coal, sampled			2

Proximate analysis

	As received	Moisture free
Moisture	4.37	0.00
Volatile matter	37.99	39.73
Fixed carbon	44.04	46.05
Ash	13.60	14.22
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.01	69.03
Hydrogen	4.85	4.56
Oxygen	12.32	8.82
Nitrogen	1.21	1.27
Sulphur	2.01	2.10
Ash	13.60	14.22
	100.00	100.00

[1]Stout, W., Geol. Survey Ohio, Bull. 31, pp. 163, 168.

		As received	Moisture free
Heating value	Calories	6,474	6,770
	B. t. u.	11,654	12,187

Fusion of ash—Incipient above 2,650°F.

Sample of Brookville cannel coal taken in 1928 by W. S. Glock and L. O. Naffziger from the mine of Edward Dickerson in the central part of Section 23, Milton Township, Jackson County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, rejected	*Brookville* cannel		4½
Shale, gray, rejected		1	2
Cannel coal, sampled		1	1
Shale, black, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.63	0.00
Volatile matter	40.05	41.56
Fixed carbon	38.36	39.80
Ash	17.96	18.64
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.86	66.26
Hydrogen	5.36	5.15
Oxygen	10.66	7.71
Nitrogen	1.21	1.25
Sulphur	0.95	0.99
Ash	17.96	18.64
	100.00	100.00

Air drying loss 1.41 per cent

		As received	Moisture free
Heating value	Calories	6,407	6,648
	B. t. u.	11,533	11,967

Fusion of ash—Incipient and complete over 2,800°F.

Sample of Brookville coal taken in 1928 by W. S. Glock and L. O. Naffziger from the mine of Albert Kelley in the northwest quarter of Section 29, Jefferson Township, Jackson County. Analysis by D. J. Demorest. Sample moist.

		Ft.	In.
Shale roof.			
Clay, gray, rejected			11¼
Coal, sampled	*Brookville*		9½
Coal, bony, rejected			7½
Coal, sampled		2	1¾
Shale, gray, floor.			

Proximate analysis

	As received	Moisture free
Moisture	10.64	0.00
Volatile matter	38.26	42.81
Fixed carbon	44.43	49.73
Ash	6.67	7.46
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.67	73.49
Hydrogen	5.94	5.33
Oxygen	19.02	10.70
Nitrogen	1.53	1.71
Sulphur	1.17	1.31
Ash	6.67	7.46
	100.00	100.00

Air drying loss 2.62 per cent

		As received	Moisture free
Heating value	Calories	6,477	7,248
	B. t. u.	11,659	13,047

Fusion of ash: Incipient 2,739°F.; Complete 2,780°F.

Sample of Brookville coal taken in 1928 by W. S. Glock and L. O. Naffziger from the mine of Fred Smith in the southeast quarter of Section 33, Vernon Township, Scioto County. Analysis by D. J. Demorest.

		Ft.	In.
Coal, sampled			8
Coal, bony, rejected			3
Coal, sampled	*Brookville*		9¾
Clay, rejected			6
Coal, sampled			7
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	9.03	0.00
Volatile matter	37.94	41.71
Fixed carbon	44.17	48.55
Ash	8.86	9.74
	100.00	100.00
Sulphur	3.35	3.68

Air drying loss 3.47 per cent

		As received	Moisture free
Heating value	Calories	6,417	7,054
	B. t. u.	11,551	12,697

Fusion of ash: Incipient 2,237°F.; Complete 2,402°F.

OGAN COAL

The name Ogan was applied by Stout to an unimportant coal bed in Vinton County. Its position is about 24 feet above the Brookville coal and just below the Zaleski flint, as is shown in a preceding section.[1] The bed has a maximum thickness of 3 feet but its average is only about 10 inches. It has been mined in a very small way for local use.

WINTERS COAL

The Winters coal is found in southern Vinton and northern Jackson counties, the area being about 180 square miles. Its position is above the Zaleski flint whereas the Ogan coal is below this bed. In thickness the Winters coal ranges from a soot streak to 4 feet with an average of 2 feet 3 inches. The coal has been mined in a small way for railroad shipment but its main use has been for a domestic supply.

Sections and analyses

Sample of the Winters coal cut in 1922 by W. Stout in the John West mine on the William Elliott property in east central Section 26, Elk Township, Vinton County. Analysis by D. J. Demorest.

		Ft.	In.
Shale		6	0
Coal, bony, sampled	*Winters*		3½
Coal, with pyrite 8 inches from top, sampled		1	0
Shale, rejected			4
Coal, sampled			4½
Shale, rejected			1¾
Coal, sampled		1	5
Clay, very siliceous.			

Proximate analysis

	As received	Moisture free
Moisture	6.69	0.00
Volatile matter	35.56	38.11
Fixed carbon	43.95	47.10
Ash	13.80	14.79
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.04	68.63
Hydrogen	4.98	4.54
Oxygen	14.63	9.30
Nitrogen	1.21	1.30
Sulphur	1.34	1.44
Ash	13.80	14.79
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,250	6,699
	B. t. u.	11,251	12,058

Fusion of ash, incipient above 2,650°F.

[1]Page 29.

Sample of Winters coal cut by W. Stout in 1922 on land of George L. Ferris in the southwestern part of Section 33, Madison Township, Vinton County. Analysis by D. J. Demorest.

		Ft.	In.
Coal, bony, rejected			2
Shale, rejected			3
Coal, sampled	*Winters*	1	0
Shale, rejected	*Winters*		2
Coal, sampled	*Winters*		7½
Shale, rejected	*Winters*		½
Coal, sampled	*Winters*		8

Proximate analysis

	As received	Moisture free
Moisture	6.06	0.00
Volatile matter	38.74	41.24
Fixed carbon	46.38	49.37
Ash	8.82	9.39
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.54	72.96
Hydrogen	5.12	4.74
Oxygen	14.46	9.66
Nitrogen	1.25	1.33
Sulphur	1.81	1.92
Ash	8.82	9.39
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,750	7,186
	B. t. u.	12,151	12,935

Fusion of ash	Incipient	2,560°F.
	Complete	2,640°F.

Sample of Winters coal cut in 1914 by W. Stout in mine of The Minglewood Coal Co., north central Section 34, Milton Township, Jackson County. Analysis by E. E. Somermeier.

		Ft.	In.
Shale, black, bony		1	1
Coal	*Clarion*		10
Coal, bony	*Clarion*		3
Clay	*Clarion*		6
Coal	*Clarion*	1	2
Clay	*Clarion*		1
Coal	*Clarion*		8
Covered		4	9
Shale, gray		4	0
Shale with thin coal bands		1	0
Coal, sampled	*Winters*	2	0
Clay, rejected	*Winters*		1
Coal, sampled	*Winters*		8
Shale, gray		1	4
Ore, *Zaleski* member			2
Shale, gray			3
Coal, *Ogan*			6

Proximate analysis	As received	Moisture free
Moisture	9.31	0.00
Volatile matter	36.78	40.56
Fixed carbon	47.78	52.68
Ash	6.13	6.76
	100.00	100.00

Ultimate analysis	As received	Moisture free
Carbon	67.80	74.76
Hydrogen	5.70	5.15
Oxygen	17.10	9.73
Nitrogen	1.27	1.40
Sulphur	2.00	2.20
Ash	6.13	6.76
	100.00	100.00

Air drying loss 4.90 per cent

		As received	Moisture free
Heating value	Calories	6,976	7,692
	B. t. u.	12,557	13,846

The carbon and hydrogen of the above ultimate analysis were obtained by calculation.

CLARION OR No. 4a COAL

The Clarion coal can be traced from the Ohio-Pennsylvania line southwest to the Ohio River. However, along most of this line of outcrop the bed is too thin to be worked. The one deposit of importance lies in the southern part of the State and includes northern Lawrence, eastern Scioto, eastern Jackson, northwestern Gallia, and southern Vinton counties. At present this is one of the two most important deposits of coal in the area outlined, the other being the Lower Kittanning.

The position of the Clarion coal with reference to the lower members of the Allegheny series is shown in a preceding section. (Page 29.) The following record from Milton Township, Jackson County, shows the place of this coal in the upper part of the Allegheny:[1]

	Ft.	In.
Coal blossom, *Middle Kittanning*	1	0
Clay	1	0
Shale	21	0
Clay shale	2	0
Clay with large ore nodules	2	0
Clay flint, *Oak Hill*	2	0
Clay shale	1	0
Shale	1	0
Shale with irregular bands of kidney ore	3	0
Shale, gray	19	0
Clay shale	1	0
Coal, *Lower Kittanning, No. 5*	2	8
Clay	1	0
Sandstone, shaly	7	0
Covered	15	6
Sandstone	3	0
Disconformity		
Shale, fissile, black	1	3
Coal, *Clarion, 4a*	4	2

[1]Stout, W., Geol. Survey Ohio, Fourth Series Bull. 20, p. 209.

The coal bed is easily identified in southern Ohio by its position with reference to the Vanport limestone. In places the coal lies directly below this limestone but elsewhere it is separated from the limestone by from 1 to 30 feet of shale.

The usual structure of the coal is three benches separated by two partings of clay. This varies, however, and especially so along the margin of the field. According to Stout, the thickness of the bed in southern Ohio is 3 feet 5 inches of coal and that of coal and partings 4 feet 1 inch.

The Clarion coal is moderate in heating value, high in sulphur and ash. The clay partings render clean mining difficult. The coal does very well for steam generation, general heating, and for burning common ceramic wares. It is an asset of great value in southern Ohio.

Sections and analyses

Sample of Clarion coal cut in 1901 by Edward Orton, Jr., in mine of Isaac Hall, one and one-fourth miles north of Moulton, Section 15, Decatur Township, Lawrence County. Surface of coal had been exposed two months. Analysis by Lord and Somermeier.

		Ft.	In.
Limestone, *Vanport*, unmeasured.			
Coal, upper bench, sampled	*Clarion*	1	0
Shale, rejected			5–7
Coal, middle bench, sampled		1	6
Shale, rejected			2–3
Coal, lower bench, sampled			6–7
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	6.11	0.00
Volatile matter	38.43	40.93
Fixed carbon	45.52	48.48
Ash	9.94	10.59
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.53	69.79
Hydrogen	5.42	5.05
Oxygen	14.28	9.42
Nitrogen	1.22	1.30
Sulphur	3.61	3.85
Ash	9.94	10.59
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,643	7,075
	B. t. u.	11,957	12,735

Sample of Clarion coal cut by Edward Orton, Jr., in 1901 in the mine of McGugin and Co., northwest quarter of Section 7, Decatur

Township, Lawrence County. Sample cut from an old entry where the coal was weathered. Analysis by Lord and Somermeier.

		Ft.	In.
Limestone, *Vanport*		8	0
Coal, upper bench, sampled	*Clarion*		10
Shale, rejected			6
Coal, middle bench, sampled		2	0
Shale, rejected			4
Coal, lower bench, sampled		1	6
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	6.34	0.00
Volatile matter	35.30	37.69
Fixed carbon	40.95	43.72
Ash	17.41	18.59
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	57.92	61.84
Hydrogen	4.91	4.49
Oxygen	13.40	8.29
Nitrogen	1.07	1.14
Sulphur	5.29	5.65
Ash	17.41	18.59
	100.00	100.00

		As received	Moisture free
Heating value	Calories	5,967	6,371
	B. t. u.	10,741	11,468

Sample of Clarion coal cut in 1901 by Edward Orton, Jr., in mine of McGugin and Co., north central Section 3, Decatur Township, Lawrence County. Sample cut well under hill where coal was clean and bright. Analysis by Lord and Somermeier.

		Ft.	In.
Limestone, *Vanport*		7–8	0
Coal, upper bench, sampled	*Clarion*		11½
Shale, rejected			5½
Coal, middle bench with one thin parting, sampled		2	2½
Shale, rejected			1½
Coal, lower bench, sampled		1	6

Proximate analysis

	As received	Moisture free
Moisture	5.86	0.00
Volatile matter	37.25	39.57
Fixed carbon	41.61	44.20
Ash	15.28	16.23
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	60.22	63.96
Hydrogen	5.06	4.68
Oxygen	12.90	8.19
Nitrogen	1.18	1.25
Sulphur	5.36	5.69
Ash	15.28	16.23
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,185	6,570
	B. t. u.	11,133	11,826

Sample of Clarion coal cut in 1901 by Edward Orton, Jr., in mine of J. R. Edwards, Section 23, Washington Township, Lawrence County. Sample taken 75 feet from mine entrance where the coal was fresh. Analysis by Lord and Somermeier.

		Ft.	In.
Limestone, *Vanport.*			
Coal, upper bench, sampled	*Clarion*	1	0
Shale, rejected			5
Coal, middle bench, sampled		1	6
Shale, rejected			2
Coal, lower bench, sampled			6
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	6.00	0.00
Volatile matter	39.16	41.66
Fixed carbon	42.98	45.72
Ash	11.86	12.62
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.32	67.36
Hydrogen	5.26	4.88
Oxygen	13.24	8.41
Nitrogen	1.22	1.30
Sulphur	5.10	5.43
Ash	11.86	12.62
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,519	6,935
	B. t. u.	11,734	12,483

Sample of Clarion coal cut by Edward Orton, Jr., in 1901, in mine of Morgan and Horton, Section 5, Bloom Township, Scioto County. The sample was taken well under cover. Analysis by Lord and Somermeier. The section as cut is approximately as follows:

		Ft.	In.
Limestone, *Vanport*		8	0
Shale, draw slate			4
Coal, good, sampled	*Clarion*	1	0
Shale and bone coal, rejected			4
Coal, good, sampled		1	7
Clay with pyrite, rejected			1
Coal, good, sampled			5
Clay, siliceous		2	0

Proximate analysis

	As received	Moisture free
Moisture	6.80	0.00
Volatile matter	37.92	40.69
Fixed carbon	45.94	49.29
Ash	9.34	10.02
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.30	70.06
Hydrogen	5.33	4.91
Oxygen	15.35	9.99
Nitrogen	1.23	1.32
Sulphur	3.45	3.70
Ash	9.34	10.02
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,577	7,057
	B. t. u.	11,839	12,703

Sample of Clarion coal cut in 1900 by Edward Orton, Jr., in the Old Limestone Furnace mine, southwest quarter of Section 32, Bloomfield Township, Jackson County. Analysis by Lord and Somermeier.

		Ft.	In.
Limestone, *Vanport*		6	0
Coal, bony, rejected	*Clarion*		3
Coal, upper bench, sampled		1	10
Shale, rejected			6
Coal, middle bench, sampled		1	2½
Shale, rejected			1½
Coal, lower bench, sampled			9
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	5.31	0.00
Volatile matter	37.33	39.42
Fixed carbon	43.82	46.28
Ash	13.54	14.30
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	62.05	65.53
Hydrogen	4.98	4.64
Oxygen	12.12	7.81
Nitrogen	1.23	1.30
Sulphur	6.08	6.42
Ash	13.54	14.30
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,394	6,753
	B. t. u.	11,509	12,154

Sample of Clarion coal cut by Edward Orton, Jr., in 1900 in the mine of Isaac Hall, Kitchen Station, north central Section 32, Madison Township, Jackson County. The sample was taken well under the hill.

Analysis by Lord and Somermeier. The section as cut is approximately as follows:

		Ft.	In.
Limestone, *Vanport*		7	0
Coal, somewhat bony, sampled	*Clarion*	1	3
Clay, impure, rejected			7
Coal, good, sampled		1	7
Shale, with pyrite			2
Coal, good, sampled		1	0
Clay, shaly, rejected			7
Coal, bony, rejected			3
Sandstone, massive.			

Proximate analysis

	As received	Moisture free
Moisture	4.90	0.00
Volatile matter	35.75	37.59
Fixed carbon	45.65	48.00
Ash	13.70	14.41
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	62.57	65.79
Hydrogen	4.89	4.57
Oxygen	11.47	7.48
Nitrogen	1.23	1.29
Sulphur	6.14	6.46
Ash	13.70	14.41
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,460	6,793
	B. t. u.	11,628	12,227

Sample of Clarion coal cut in 1900 by Edward Orton, Jr., in Iron Valley mine of the Iron Valley Mining Co., northeast Section 2, Milton Township, Jackson County. Surface of coal had been exposed two months. Analysis by Lord and Somermeier. The section as cut is approximately as follows:

		Ft.	In.
Limestone, *Vanport*		6	8
Shale, hard, bony		2	4
Coal, somewhat bony, sampled	*Clarion*	1	3
Clay with bands of bony coal, rejected			7
Coal, good, sampled		1	5
Clay, with pyrite, rejected			1
Coal, good, sampled		1	2
Clay, siliceous.			

Proximate analysis

	As received	Moisture free
Moisture	5.61	0.00
Volatile matter	38.92	41.23
Fixed carbon	47.38	50.20
Ash	8.09	8.57
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.30	71.29
Hydrogen	5.47	5.14
Oxygen	14.16	9.72
Nitrogen	1.28	1.36
Sulphur	3.70	3.92
Ash	8.09	8.57
	100.00	100.00

Heating value		As received	Moisture free
	Calories	6,863	7,271
	B. t. u.	12,353	13,087

Sample of Clarion coal cut in 1900 by Edward Orton, Jr., in No. 10 mine of Superior Coal Co., northwest Section 13, Milton Township, Jackson County. Sample was cut 50 to 60 feet under the hill in comparatively new workings. Analysis by Lord and Somermeier.

		Ft.	In
Coal, upper bench, sampled		1	3
Shale, rejected			7
Coal, middle bench, sampled	*Clarion*	1	2
Shale, rejected			1½
Coal, lower bench, sampled		1	1½

Proximate analysis

	As received	Moisture free
Moisture	4.98	0.00
Volatile matter	39.71	41.79
Fixed carbon	45.51	47.90
Ash	9.80	10.31
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.14	69.61
Hydrogen	5.39	5.09
Oxygen	13.31	9.35
Nitrogen	1.28	1.35
Sulphur	4.08	4.29
Ash	9.80	10.31
	100.00	100.00

Heating value		As received	Moisture free
	Calories	6,801	7,157
	B. t. u.	12,242	12,883

Sample of Clarion coal cut by J. W. Groves in 1905 in No. 10 mine of Superior Coal Co., Section 13, Milton Township, Jackson County. Authority, United States Geological Survey.[1]

[1]Bulletin 290, p. 140.

		Ft.	In.
Shale roof.			
Coal, sampled	Clarion	1	6
Shale, rejected			11
Coal, sampled		1	3
Shale, rejected			2
Coal, sampled			3
Shale, rejected			1½
Coal, sampled			9
Clay floor.			
Thickness of bed		4	11½
Thickness of coal sampled		3	9

Proximate analysis

	As received	Moisture free
Moisture	8.45	0.00
Volatile matter	41.27	45.08
Fixed carbon	43.55	47.57
Ash	6.73	7.35
	100.00	100.00
Sulphur	3.10	3.39
Air drying loss 4.90 per cent		
Heating value — Calories	6,805	7,433
Heating value — B. t. u.	12,249	13,379

Another sample from the same mine gave the following results:

Proximate analysis

	As received	Moisture free
Moisture	7.50	0.00
Volatile matter	39.25	42.43
Fixed carbon	42.74	46.21
Ash	10.51	11.36
	100.00	100.00
Sulphur	5.44	5.88
Air drying loss 3.7 per cent		

Sample of Clarion coal cut in 1900 by Edward Orton, Jr., in mine of Superior Coal Co., Section 36, south, Milton Township, Jackson County. Surface of the coal apparently fresh. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, upper bench, sampled		1	6
Shale, rejected			7
Coal, middle bench, sampled	*Clarion*	1	2½
Shale, rejected			1½
Coal, lower bench, sampled		1	1

Proximate analysis

	As received	Moisture free
Moisture	4.71	0.00
Volatile matter	40.51	42.51
Fixed carbon	46.17	48.45
Ash	8.61	9.04
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.51	70.85
Hydrogen	5.44	5.16
Oxygen	13.45	9.72
Nitrogen	1.26	1.32
Sulphur	3.73	3.91
Ash	8.61	9.04
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,911	7,253
	B. t. u.	12,440	13,055

Sample of Clarion coal cut in 1900 by Edward Orton, Jr., in V. A. Pittinger mine, northwest Section 17, Milton Township, Jackson County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, upper bench, sampled			11½
Shale, rejected			9
Coal, middle bench, sampled	*Clarion*	1	4
Shale, rejected			1½
Coal, lower bench, sampled		1	2
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	5.33	0.00
Volatile matter	41.01	43.32
Fixed carbon	45.26	47.81
Ash	8.40	8.87
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.52	70.26
Hydrogen	5.50	5.19
Oxygen	14.58	10.40
Nitrogen	1.28	1.35
Sulphur	3.72	3.93
Ash	8.40	8.87
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,825	7,209
	B. t. u.	12,285	12,976

Sample of Clarion coal cut by Edward Orton, Jr., in 1900, in the John Lawler mine, central Section 27, Wilkesville Township, Vinton County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, upper bench, sampled	Clarion	1	6½
Shale, rejected			6½
Coal, middle bench, sampled		1	2
Shale, rejected			1½
Coal, lower bench, sampled		1	1
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	4.52	0.00
Volatile matter	40.10	42.00
Fixed carbon	46.53	48.73
Ash	8.85	9.27
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.17	70.35
Hydrogen	5.44	5.17
Oxygen	13.03	9.44
Nitrogen	1.28	1.34
Sulphur	4.23	4.43
Ash	8.85	9.27
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,904	7,231
	B. t. u.	12,427	13,015

Sample of Clarion coal cut by J. W. Groves in Clarion mine of the Gallia Mining Co., at Clarion, northwest Section 22, Wilkesville Township, Vinton County.[1] Sample taken well under cover. Analysis by United States Geological Survey.

Sample taken 900 feet northeast of drift mouth.

		Ft.	In.
Shale roof.			
Coal, sampled	Clarion	1	6
Coal, bony, excluded			2½
Shale, excluded			5½
Coal, sampled		1	1
Shale, excluded			2
Coal, sampled		1	0
Clay floor.			

[1]United States Geological Survey Bulletin 290, p. 163; Bureau of Mines Bulletin 22, pp. 148, 673.

Proximate analysis

	As received	Moisture free
Moisture	6.79	0.00
Volatile matter	40.01	42.92
Fixed carbon	45.54	48.86
Ash	7.66	8.22
	100.00	100.00
Sulphur	3.34	3.58
Heating value — Calories	6,952	7,458
Heating value — B. t. u.	12,514	13,424

Air drying loss 2.80 per cent

Another sample taken 800 feet west of drift mouth.

		Ft.	In.
Shale roof.			
Coal, sampled	*Clarion*		10
Pyrite, excluded			½
Coal, sampled		1	0
Coal, bony, excluded			2
Shale, excluded			5½
Coal, sampled			11
Shale, excluded			3
Coal, sampled			7½
Clay floor.			

Proximate analysis

	As received	Moisture free
Moisture	7.38	0.00
Volatile matter	41.60	44.92
Fixed carbon	44.86	48.43
Ash	6.16	6.65
	100.00	100.00
Sulphur	2.77	2.99

Air drying loss 3.4 per cent

Sample of Clarion coal cut by Edward Orton, Jr., in 1900, in mine of Elmer Keck and Co., central Section 24, Wilkesville Township, Vinton County. Analysis by Lord and Somermeier.

		Ft	In.
Coal, upper bench, sampled	*Clarion*	1	3
Shale, rejected			11
Coal, middle bench, sampled		1	1½
Pyrite and shale, rejected			1½
Coal, lower bench, sampled		1	2½

Proximate analysis

	As received	Moisture free
Moisture	4.72	0.00
Volatile matter	39.88	41.86
Fixed carbon	44.19	46.38
Ash	11.21	11.76
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.04	68.26
Hydrogen	5.36	5.08
Oxygen	12.95	9.19
Nitrogen	1.28	1.34
Sulphur	4.16	4.37
Ash	11.21	11.76
	100.00	100.00

Heating value		As received	Moisture free
	Calories	6,744	7,078
	B. t. u.	12,139	12,740

Sample of Clarion coal cut by Edward Orton, Jr., in 1900, in mine of Vinton Coal Co., north central Section 33, Vinton Township, Vinton County. Analysis by Lord and Somermeier.

		Ft.	In.
Pyrite lenses and bone coal, rejected	*Clarion*		2
Coal, upper bench, sampled		1	4
Shale and coal, rejected			9
Coal, middle bench, sampled			11
Shale, rejected			1½
Coal, lower bench, sampled			11
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.61	0.00
Volatile matter	41.35	43.35
Fixed carbon	42.94	45.01
Ash	11.10	11.64
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.91	68.05
Hydrogen	5.36	5.08
Oxygen	12.05	8.33
Nitrogen	1.30	1.36
Sulphur	5.28	5.54
Ash	11.10	11.64
	100.00	100.00

Heating value		As received	Moisture free
	Calories	6,760	7,087
	B. t. u.	12,168	12,756

Sample of Clarion coal cut by Edward Orton, Jr., in 1900, in Hanging Rock mine, operated by Carl Goddard, southwest quarter of Section 34, Vinton Township, Vinton County. The sample is a composite one having been cut from two rooms, the face of each being fresh. Analysis by Lord and Somermeier. The section as cut is approximately as follows:

		Ft.	In.
Shale, gray, siliceous.			
Coal, somewhat bony, sampled	*Clarion*	1	4½
Clay and shale, rejected			7½
Coal, good, sampled		1	4
Clay with pyrite, rejected			1
Coal, good, sampled			6½
Clay, plastic		2	0

Proximate analysis

	As received	Moisture free
Moisture	5.02	0.00
Volatile matter	40.31	42.44
Fixed carbon	46.52	48.98
Ash	8.15	8.58
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.52	72.14
Hydrogen	5.49	5.19
Oxygen	13.69	9.72
Nitrogen	1.28	1.35
Sulphur	2.87	3.02
Ash	8.15	8.58
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,961	7,379
	B. t. u.	12,530	13,192

Sample of Clarion coal cut in 1901 by E. E. Somermeier in the J. T. Dickson mine, northwest quarter of Section 27, Elk Township, Vinton County. Sample cut from fresh surface. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled	*Clarion*		8
Coal, bony, rejected			5
Shale, rejected			5
Coal, lower bench, sampled		2	10

Proximate analysis

	As received	Moisture free
Moisture	4.95	0.00
Volatile matter	39.17	41.21
Fixed carbon	46.56	48.98
Ash	9.32	9.81
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.17	70.67
Hydrogen	5.40	5.10
Oxygen	13.28	9.34
Nitrogen	1.30	1.37
Sulphur	3.53	3.71
Ash	9.32	9.81
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,914	7,274
	B. t. u.	12,445	13,093

Sample of Clarion coal cut in 1923 by W. Stout and Miles Ogan, in mine of George Weaver, one and one-half miles southeast of Zaleski, Madison Township, Vinton County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, black		1	0
Coal, sampled	*Clarion*		10
Pyrite, local, rejected			½
Coal, sampled			9
Pyrite, rejected			1½
Coal, sampled			7½
Clay, rejected			3½
Coal, sampled			4
Clay, rejected		1	5½
Coal, sampled		1	2
Shale, bony, rejected			2
Coal, sampled			5

Proximate analysis

	As received	Moisture free
Moisture	4.80	0.00
Volatile matter	40.56	42.60
Fixed carbon	42.21	44.34
Ash	12.43	13.06
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.56	68.87
Hydrogen	4.96	4.65
Oxygen	12.33	8.46
Nitrogen	1.21	1.27
Sulphur	3.51	3.69
Ash	12.43	13.06
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,567	6,898
	B. t. u.	11,821	12,417

Fusion of ash: Incipient 2,550°F.; Complete 2,610°F.

Sample of Clarion coal cut in 1901 by E. E. Somermeier in the mine of Trace, Rider, and Plummer, Section 29, Madison Township, Vinton County. Sample was taken well under the hill.

		Ft.	In.
Shale.			
Coal, upper bench, sampled	*Clarion*	1	7
Shale, rejected			1
Coal, lower bench, sampled		1	0
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	5.02	0.00
Volatile matter	39.90	42.01
Fixed carbon	46.11	48.55
Ash	8.97	9.44
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.92	71.51
Hydrogen	5.48	5.18
Oxygen	12.98	8.97
Nitrogen	1.33	1.40
Sulphur	3.32	3.50
Ash	8.97	9.44
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,960	7,328
	B. t. u.	12,528	13,190

Sample of Clarion coal cut in 1902 by B. A. Eisenlohr in mine of George Cherry, Section 3, Swan Township, Vinton County. Sample taken about 60 feet from outcrop. Analysis by Lord and Somermeier.

		Ft.	In.
Shale		2	2½
Coal, upper bench, sampled	*Clarion*	1	8
Clay, rejected	*Clarion*		2
Coal, lower bench, sampled	*Clarion*		11
Coal, bony, sampled	*Clarion*		8

Proximate analysis

	As received	Moisture free
Moisture	4.90	0.00
Volatile matter	39.16	41.18
Fixed carbon	45.79	48.15
Ash	10.15	10.67
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.26	69.67
Hydrogen	5.40	5.11
Oxygen	12.71	8.79
Nitrogen	1.23	1.29
Sulphur	4.25	4.47
Ash	10.15	10.67
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,845	7,198
	B. t. u.	12,321	12,956

Sample of Clarion coal cut in 1917 by R. E. Lamborn in the G. L. Porter mine, one-half mile south of Coaldale, Hopewell Township, Muskingum County. The sample was 5 by 12 inches and was under heavy cover. Analysis by D. J. Demorest.

		Ft.	In.
Shale, dark, left for roof			6
Coal, bony, with much sulphur, sampled			6
Coal, good, sampled		2	10
Shale, pyritiferous, rejected	*Clarion*		3½
Coal, good, sampled			5
Shale, pyritiferous, rejected			2½
Coal, good, sampled		1	3

Proximate analysis

	As received	Moisture free
Moisture	6.89	0.00
Volatile matter	41.49	44.56
Fixed carbon	42.92	46.10
Ash	8.70	9.34
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.28	72.26
Hydrogen	5.57	5.16
Oxygen	14.24	8.72
Nitrogen	1.19	1.28
Sulphur	3.02	3.24
Ash	8.70	9.34
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,706	7,202
	B. t. u.	12,071	12,964

SCRUBGRASS COAL

The name Scrubgrass coal is of Pennsylvania origin and was first used by H. D. Rogers. The position of the bed is between the Clarion coal and the overlying Vanport limestone. The coal is nowhere of importance in Ohio, and is rarely worked even in a small way. According to Stout the bed is at its best in Vinton County but even there its average thickness is less than 1 foot and its maximum only 1 foot 7 inches.

LAWRENCE COAL

The Lawrence coal is thin and of no value as fuel but it is persistent and can be followed across the State from Columbiana County southwest to Lawrence. The bed is thickest in the latter county but it is nowhere mined. The place of the coal is only a few feet below the Lower Kittanning.

LOWER KITTANNING OR No. 5 COAL

The Lower Kittanning is the most important coal bed thus far reached in this review of the coals of Ohio. Stout ranks it fourth in the State. The coal is somewhat patchy, but many of the deposits are large and the fuel is of good quality. Its value is enhanced by the

very large and valuable clays closely associated with it. The following section in Jackson County shows the position of this coal with reference to the clays and also to the higher coals of the Allegheny series.[1]

		Ft.	In.
Coal blossom, *Upper Freeport*		1	0
Covered		14	0
Sandstone		6	0
Covered		42	0
Shale, sandstone, and covered		21	0
Coal blossom, *Middle Kittanning*		1	0
Clay		2	0
Shale and covered		9	0
Sandstone, shaly		7	0
Clay, part flint, *Oak Hill*		3	0
Shale		16	0
Coal	*Lower Kittanning*	2	4
Clay	*Lower Kittanning*		1
Coal	*Lower Kittanning*		3
Clay, *Lower Kittanning*		7	0

As the preceding section is from the southeast part of Ohio, another one is given, and this from Saline Township, Jefferson County, in the northeast quarter of the State.[2]

		Ft.	In.
Coal, *Upper Freeport*		2	6
Shale and covered		52	0
Coal, *Lower Freeport*		2	8
Clay, light, calcareous		1	0
Limestone, nodular, *Lower Freeport*		2	0
Clay, part flint		2	0
Shale and shaly sandstone		60	5
Shale, black, bony, fossiliferous, near top		2	3
Shale with ore nodules		5	4
Coal, good	*Middle Kittanning*	2	2
Coal, very bony	*Middle Kittanning*		6
Clay, siliceous with concretions		5	0
Shale, with ore nodules		14	0
Coal, *Lower Kittanning*		3	0
Clay, plastic		6	0
Clay, shaly		3	0
Shale and sandstone		65	0
Coal, *Clarion*			3

While the coal can be easily traced from Columbiana County southwest across the State to Scioto and Lawrence counties on the Ohio River, the largest deposits lie in Columbiana, Tuscarawas, Jack-

[1]Geol. Survey Ohio, Bull. 20, p. 267.
[2]Geol. Survey Ohio, Bull. 28, p. 121.

son, and Lawrence. The coal is mined in a small way in nearly all the counties along the line of outcrop.

Years ago the Lower Kittanning coal was mined in the vicinity of Leetonia and coked for use in local blast furnaces. More recently it has been mined by stripping near Sandyville, Stark County; Dundee, Tuscarawas County; and Redfield, Perry County. However, the chief mining center of this coal has been in Lawrence County where it has long been known as the Newcastle bed. The coal has had a large market in Ironton and much has been shipped northward. That most accessible to railroads has been worked out in large part, but much remains back from shipping lines. The composition, heating value, thickness, and structure of the Lower Kittanning coal are well shown in the following sections.

Sections and analyses

Sample of Lower Kittanning coal cut in 1921 by C. F. Moses in mine of M. S. Stoffer and Sons, Section 12, Knox Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, very siliceous		4	0
Shale, soft, fossiliferous, *Hamden*		1	6
Coal, bony, rejected	*Lower Kittanning*		½
Coal, sampled	*Lower Kittanning*	3	0
Clay, plastic		1	0

Proximate analysis

	As received	Moisture free
Moisture	4.55	0.00
Volatile matter	42.60	44.63
Fixed carbon	45.33	47.50
Ash	7.52	7.87
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.57	71.84
Hydrogen	5.38	5.11
Oxygen	13.05	9.44
Nitrogen	1.24	1.30
Sulphur	4.24	4.44
Ash	7.52	7.87
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,119	7,458
	B. t. u.	12,815	13,425

Fusion of ash	Incipient	2,137°F.
	Complete	2,270°F.

Sample of Lower Kittanning coal cut in 1921 by C. F. Moses in mine of the Beaver Coal and Clay Co., southeast Section 9, Center Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, good, sampled	*Lower Kittanning*	2	4
Pyrite, rejected			¾
Coal, good, sampled			11

Proximate analysis

	As received	Moisture free
Moisture	2.53	0.00
Volatile matter	43.66	44.80
Fixed carbon	46.24	47.44
Ash	7.57	7.76
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.64	72.48
Hydrogen	5.38	5.24
Oxygen	10.26	8.20
Nitrogen	1.13	1.17
Sulphur	5.02	5.15
Ash	7.57	7.76
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,372	7,564
	B. t. u.	13,270	13,615

Fusion of ash	Incipient	2,482°F.
	Complete	2,590°F.

Analysis of ash

Ignition loss	1.65
Silica, SiO_2	27.10
Alumina, Al_2O_3	10.51
Ferric oxide, Fe_2O_3	55.64
Titanic oxide, TiO_2	.72
Phosphorus pentoxide, P_2O_5	.08
Lime, CaO	2.30
Magnesia, MgO	.54
Potassium oxide, K_2O	.78
Sodium oxide, Na_2O	.46
Manganous oxide, MnO	.04
Sulphur	.31
	100.13

Sample of Lower Kittanning coal cut in 1921 by C. F. Moses in mine of James Plankton, west central Section 23, St. Clair Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, roof.			
Coal and shale, rejected	*Lower Kittanning*	1	2
Clay, rejected			½
Coal, somewhat bony, sampled			7½
Coal, good, sampled			3½
Clay, rejected			3½
Coal, good, sampled			5

Proximate analysis

	As received	Moisture free
Moisture	3.67	0.00
Volatile matter	37.68	39.12
Fixed carbon	51.81	53.78
Ash	6.84	7.10
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	73.13	75.91
Hydrogen	5.31	5.09
Oxygen	11.02	8.05
Nitrogen	1.20	1.25
Sulphur	2.50	2.60
Ash	6.84	7.10
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,414	7,696
	B. t. u.	13,345	13,853

Fusion of ash	Incipient	2,408°F.
	Complete	2,523°F.

Sample of Lower Kittanning coal cut in 1916 by J. H. Hance from the Smith coal bank in the Lisbon field in western half of Section 24, St. Clair Township, Columbiana County. Collected by the United States Geological Survey and analyzed by the Bureau of Mines.[1]

		Ft.	In.
Shale, sandy.			
Coal, bony, excluded	*Lower Kittanning*		1
Coal, sampled		1	2¾
Clay, excluded			¼
Coal, sampled			7
Clay, excluded			1
Coal, sampled			6½
Clay			3

Proximate analysis

	As received	Moisture free
Moisture	4.03	0.00
Volatile matter	36.69	38.23
Fixed carbon	53.03	55.26
Ash	6.25	6.51
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	74.65	77.79
Hydrogen	5.46	5.22
Oxygen	9.39	6.05
Nitrogen	1.64	1.71
Sulphur	2.61	2.72
Ash	6.25	6.51
	100.00	100.00

Air drying loss 1.7 per cent

		As received	Moisture free
Heating value	Calories	7,496	7,811
	B. t. u.	13,493	14,060

[1]United States Bureau of Mines, Bull. 193, pp. 49, 203.

Sample of Lower Kittanning coal cut in 1916 by J. H. Hance from Malone's coal bank in the Lisbon field in the central part of Section 24, Liverpool Township, Columbiana County. Collected by the United States Geological Survey and analyzed by the Bureau of Mines.[1]

		Ft.	In.
Sandstone, massive, not measured.			
Shale, chocolate, excluded			5½
Coal, with streaks of bone, sampled	Lower Kittanning		7½
Pyrite, excluded			⅛
Coal, sampled			10⅜
Pyrite and clay, excluded			⅜
Coal, sampled			4¾
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	2.66	0.00
Volatile matter	41.73	42.87
Fixed carbon	43.99	45.19
Ash	11.62	11.94
	100.00	100.00
Sulphur	8.03	8.25
Air drying loss 1.2 per cent		
Heating value (Calories)	7,085	7,278
Heating value (B. t. u.)	12,753	13,100

Sample of Lower Kittanning coal cut in 1916 by J. H. Hance from Ainsworth's coal bank in Lisbon field, Section 5, Yellow Creek Township, Columbiana County. Analysis by United States Bureau of Mines.[2]

		Ft.	In.
Shale, roof.			
Shale, not included.			
Clay, shale, bone, not included	Lower Kittanning		⅜
Coal, irregular partings, sampled		1	11¾
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.46	0.00
Volatile matter	40.86	42.77
Fixed carbon	49.73	52.05
Ash	4.95	5.18
	100.00	100.00

[1]United States Bureau of Mines, Bull. 193, pp. 49, 202.
[2]United States Bureau of Mines, Bull. 193, pp. 50, 204.

	As received	Moisture free
Sulphur	3.52	3.68
Air drying loss 2.6 per cent		
Heating value..... Calories	7,540	7,892
Heating value..... B. t. u.	13,572	14,206

Sample of Lower Kittanning coal cut in 1916 by J. H. Hance in mine of Wooster Fire Clay Co., Section 9, Yellow Creek Township, Columbiana County. Analysis by United States Bureau of Mines.[1]

		Ft.	In.
Shale and clay			8
Coal, sampled	*Lower Kittanning*	1	1½
Clay, rejected	*Lower Kittanning*		⅜
Coal, sampled	*Lower Kittanning*	1	3½
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	2.67	0.00
Volatile matter	38.46	39.51
Fixed carbon	50.19	51.57
Ash	8.68	8.92
	100.00	100.00
Sulphur	5.71	5.87
Air drying loss 1.1 per cent		
Heating value..... Calories	7,340	7,541
Heating value..... B. t. u.	13,212	13,574

Sample of Lower Kittanning coal cut in 1916 by J. H. Hance in the mine of the Banfield Clay Co., southwest corner Section 26, Saline Township, Jefferson County. Analysis by United States Bureau of Mines.[2]

		Ft.	In.
Shale, bituminous.			
Coal, bony, rejected	*Lower Kittanning*		2¾
Coal, sampled	*Lower Kittanning*		4
Clay, black, sampled	*Lower Kittanning*		½
Coal, sampled	*Lower Kittanning*	2	0
Shale, bony, with pyrite, rejected			1½

[1]United States Bureau of Mines, Bull. 193, pp. 50, 206.
[2]United States Bureau of Mines, Bull. 193, pp. 51, 208.

Proximate analysis

	As received	Moisture free
Moisture	3.44	0.00
Volatile matter	37.17	38.49
Fixed carbon	46.71	48.38
Ash	12.68	13.13
	100.00	100.00
Sulphur	7.30	7.56
Air drying loss 2.1 per cent		
Heating value — Calories	6,907	7,154
Heating value — B. t. u.	12,433	12,877

Sample of Lower Kittanning coal cut in 1916 by J. H. Hance from the No. 2 mine of the East Ohio Sewer Pipe Co., south central Section 26, Saline Township, Jefferson County. Analysis by United States Bureau of Mines.[1]

		Ft.	In.
Coal, sampled	*Lower Kittanning*		4¾
Clay, sampled			¼
Coal, sampled			9½
Clay and pyrite, rejected			⅜
Coal, sampled			10½
Clay and pyrite, rejected			1
Coal, sampled		1	1¼
Pyrite, coal, clay, rejected			2¾

Proximate analysis

	As received	Moisture free
Moisture	2.21	0.00
Volatile matter	39.63	40.53
Fixed carbon	47.50	48.57
Ash	10.66	10.90
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.04	72.65
Hydrogen	5.28	5.14
Oxygen	6.72	4.87
Nitrogen	1.34	1.37
Sulphur	4.96	5.07
Ash	10.66	10.90
	100.00	100.00

Air drying loss 0.7 per cent

	As received	Moisture free
Heating value — Calories	7,236	7,400
Heating value — B. t. u.	13,025	13,320

[1]United States Bureau of Mines, Bull. 193, pp. 51, 209.

Sample of Lower Kittanning coal cut in 1907 by D. D. Condit in mine of the Great Western Sewer Pipe Works, Toronto, east central Section 25, Knox Township, Jefferson County. Lord and Somermeier, analysts.

		Ft.	In.
Shale, dark.			
Coal, bony, rejected	*Lower Kittanning*		4
Coal, sampled	*Lower Kittanning*	3	1
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	2.46	0.00
Volatile matter	38.48	39.45
Fixed carbon	51.66	52.96
Ash	7.40	7.59
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	74.20	76.07
Hydrogen	5.38	5.24
Oxygen	7.93	5.88
Nitrogen	1.27	1.30
Sulphur	3.82	3.92
Ash	7.40	7.59
	100.00	100.00

Moisture in air-dried sample about 1 to 1½ per cent

		As received	Moisture free
Heating value	Calories	7,591	7,782
	B. t. u.	13,664	14,008

Sample of Lower Kittanning coal cut in 1926 by T. R. Meyers and G. W. White in mine of the Whitacre-Greer Fireproofing Co., southeast Section 22, Sandy Township, Stark County. Analysis by D. J. Demorest.

		Ft.	In.
Shale.			
Coal, somewhat bony, sampled	*Lower Kittanning*	1	0
Shale, hard, gray, rejected	*Lower Kittanning*		1
Coal, good, sampled	*Lower Kittanning*	1	2
Coal, somewhat bony, with pyrite streaks, sampled	*Lower Kittanning*		¾
Coal, good, sampled	*Lower Kittanning*		11½
Pyrite, rejected	*Lower Kittanning*		½
Coal, good, sampled	*Lower Kittanning*		1¾
Mother coal, sampled	*Lower Kittanning*		¾
Coal, good, sampled	*Lower Kittanning*		4
Clay, used in factory, *Lower Kittanning*		4	6

Proximate analysis

	As received	Moisture free
Moisture	3.81	0.00
Volatile matter	44.34	46.09
Fixed carbon	45.80	47.61
Ash	6.05	6.30
	100.00	100.00
Sulphur	3.44	3.58

Air drying loss 1.11 per cent

		As received	Moisture free
Heating value	Calories	7,268	7,556
	B. t. u.	13,083	13,601

Fusion of ash	Incipient	2,264°F.
	Complete	2,349°F.

Sample of Lower Kittanning coal cut in 1907 by D. D. Condit in Huff Run mine No. 1 of the Ridgway Burton Coal Co., Mineral City, Tuscarawas County. Sample 4½ by 3 inches, taken from a fresh face. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, dark.			
Coal, sampled			8
Coal, bony, rejected			⅜
Coal, sampled			1½
Mother coal, sampled			¼
Coal, sampled		1	1
Pyrite, local, sampled	*Lower Kittanning*		¼
Coal, sampled			4¼
Mother coal, rejected			½
Coal, sampled			4½
Coal, bony, rejected			½
Coal, sampled			9¼
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	5.30	0.00
Volatile matter	38.73	40.90
Fixed carbon	48.26	50.96
Ash	7.71	8.14
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.75	73.66
Hydrogen	5.46	5.14
Oxygen	12.65	8.38
Nitrogen	1.18	1.25
Sulphur	3.25	3.43
Ash	7.71	8.14
	100.00	100.00

Moisture in air-dried sample from 2½ to 3 per cent

		As received	Moisture free
Heating value	Calories	7,168	7,569
	B. t. u.	12,902	13,624

Sample of Lower Kittanning coal taken in 1906 by the United States Geological Survey from the Huff Run mine of the Ridgway Burton Coal Co., one-fourth mile south of Mineral City, Tuscarawas County. Sampled by J. W. Groves. Analysis by the United States Geological Survey.[1]

Taken 7,000 feet southeast of drift mouth.

[1]United States Geological Survey, Bull. 332, p. 187.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Lower Kittanning*		5
Pyrite, sampled			1/8
Coal, sampled		1	6 1/2
Coal, bony, sampled			1/2
Coal, sampled			5
Pyrite, excluded			1/4
Coal, sampled			6
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.61	0.00
Volatile matter	36.25	38.40
Fixed carbon	49.42	52.36
Ash	8.72	9.24
	100.00	100.00
Sulphur	2.89	3.06

Air drying loss 1.3 per cent

Another sample was taken 6,600 feet southeast of drift mouth.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Lower Kittanning*		2
Pyrite, excluded			1/4
Coal, sampled		1	6
Pyrite, sampled			3/8
Coal, sampled			10 1/2
Black band, excluded			2 1/4
Coal, sampled			10 3/4
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.46	0.00
Volatile matter	39.89	41.75
Fixed carbon	47.11	49.31
Ash	8.54	8.94
	100.00	100.00
Sulphur	3.73	3.90

Air drying loss 1.1 per cent

Heating value	Calories	7,136	7,469
	B. t. u.	12,845	13,444

Sample of Lower Kittanning coal taken in 1928 by W. S. Glock

and L. O. Naffziger from mine of Yost and Ed. Miller in west central Section 5, Walnut Creek Township, Holmes County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Lower Kittanning*		10½
Shale, bony, pyritiferous, rejected			1¾
Coal, sampled			6
Shale, pyritiferous, rejected			1¼
Coal, sampled		2	3
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.34	0.00
Volatile matter	43.21	46.13
Fixed carbon	44.06	47.05
Ash	6.39	6.82
	100.00	100.00
Sulphur	3.65	3.90
Air drying loss 2.39 per cent		
Heating value — Calories	6,973	7,444
Heating value — B. t. u.	12,551	13,400
Fusion of ash — Incipient	2,180°F.	
Fusion of ash — Complete	2,402°F.	

Sample of Lower Kittanning coal taken in 1928 by W. S. Glock and L. O. Naffziger from mine of G. C. Quillen & Sons, in northwest quarter of Section 13, Killbuck Township, Holmes County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Lower Kittanning*	1	8
Coal, cannel, sampled			2½
Coal, sampled			1¼
Coal, shaly, sampled			½
Coal, sampled		1	8¼
Shale, gray, floor.			

Proximate analysis

	As received	Moisture free
Moisture	7.58	0.00
Volatile matter	40.77	44.11
Fixed carbon	43.58	47.16
Ash	8.07	8.73
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.88	71.28
Hydrogen	5.58	5.13
Oxygen	15.20	9.16
Nitrogen	1.33	1.44
Sulphur	3.94	4.26
Ash	8.07	8.73
	100.00	100.00

Air drying loss 2.81 per cent

		As received	Moisture free
Heating value	Calories	6,693	7,242
	B. t. u.	12,048	13,036

Fusion of ash: Incipient 2,132°F.; Complete 2,374°F.

Sample of Lower Kittanning coal cut in 1902 by B. A. Eisenlohr in John Lutz mine on Mill Run near Zanesville, Washington Township, Muskingum County. Sample 14 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, soft.			
Shale, black			4
Coal, upper bench, sampled	*Lower Kittanning*	1	8
Clay, rejected			½
Coal, middle bench, sampled		1	0
Pyrite, rejected			2
Coal, lower bench, sampled		1	7
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	5.05	0.00
Volatile matter	39.75	41.86
Fixed carbon	47.43	49.96
Ash	7.77	8.18
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.07	71.69
Hydrogen	5.37	5.07
Oxygen	12.81	8.76
Nitrogen	1.18	1.24
Sulphur	4.80	5.06
Ash	7.77	8.18
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,983	7,354
	B. t. u.	12,569	13,237

Sample of Lower Kittanning coal cut in 1917 by W. Stout and R. E. Lamborn in mine of Henry Young, Section 14, Wayne Township, Muskingum County. Mine dry and coal fresh. Analysis by D. J. Demorest.

		Ft.	In.
Limestone, shale, and clay, *Hamden*		5	8
Coal, sampled	*Lower Kittanning*	1	0
Pyrite, irregular, rejected			1
Coal, sampled		2	1
Pyrite, irregular, rejected			1
Coal, sampled		1	3
Clay, plastic		4	0

Proximate analysis

	As received	Moisture free
Moisture	5.87	0.00
Volatile matter	41.52	44.11
Fixed carbon	43.91	46.65
Ash	8.70	9.24
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.67	70.83
Hydrogen	5.38	5.02
Oxygen	13.30	8.59
Nitrogen	1.16	1.23
Sulphur	4.79	5.09
Ash	8.70	9.24
	100.00	100.00

Air drying loss 1.6 per cent

		As received	Moisture free
Heating value	Calories	6,771	7,193
	B. t. u.	12,188	12,947

Fusion of ash: Incipient 2,028°F. Complete 2,082°F.

Sample of Lower Kittanning coal cut in 1917 by W. Stout and R. E. Lamborn in mine of L. G. Harkness, northwest Section 23, Newton Township, Muskingum County. Where sampled the coal had only about 30 feet of cover and was slightly weathered along joint planes. Analysis by D. J. Demorest.

		Ft.	In.
Shale and covered		25	0
Clay and covered, roof tender		4	0
Coal, bony, with shale, rejected	*Lower Kittanning*	0	4
Coal, good, sampled			9
Coal, bony, rejected			1
Coal, good, sampled		3	5
Clay, plastic		2	0

Proximate analysis

	As received	Moisture free
Moisture	7.96	0.00
Volatile matter	39.18	42.57
Fixed carbon	46.87	50.92
Ash	5.99	6.51
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.40	74.31
Hydrogen	5.54	5.06
Oxygen	16.30	10.02
Nitrogen	1.37	1.49
Sulphur	2.40	2.61
Ash	5.99	6.51
	100.00	100.00

Air drying loss 2.6 per cent

		As received	Moisture free
Heating value	Calories	6,893	7,489
	B. t. u.	12,407	13,480

Sample of Lower Kittanning coal cut in 1902 by B. A. Eisenlohr in Copelin's mine, Section 2, Pike Township, Perry County. Sample 12 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale			7
Coal, upper bench, sampled	*Lower Kittanning*		6
Coal, horny, rejected			1
Coal, middle bench, sampled		1	0
Clay, rejected			½
Coal, lower bench, sampled		1	9
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	6.85	0.00
Volatile matter	35.22	37.81
Fixed carbon	47.77	51.28
Ash	10.16	10.91
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.78	69.54
Hydrogen	5.26	4.83
Oxygen	13.86	8.34
Nitrogen	1.22	1.31
Sulphur	4.72	5.07
Ash	10.16	10.91
	100.00	100.00

Heating value	As received	Moisture free
Calories	6,591	7,075
B. t. u.	11,864	12,735

Sample of Lower Kittanning coal cut in 1902 by B. A. Eisenlohr in the McMonigal mine, Section 14, Pike Township, Perry County. Sample 18 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In
Clay shale, soft.			
Coal, soft and dirty, sampled	*Lower Kittanning*	1	6
Coal, upper bench, sampled			6
Clay, rejected			¾
Coal, lower bench, sampled		2	4
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	6.74	0.00
Volatile matter	37.05	39.73
Fixed carbon	49.09	52.64
Ash	7.12	7.63
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.34	73.28
Hydrogen	5.47	5.06
Oxygen	15.25	9.93
Nitrogen	1.24	1.33
Sulphur	2.58	2.77
Ash	7.12	7.63
	100.00	100 00

		As received	Moisture free
Heating value	Calories	6,885	7,382
	B. t. u.	12,393	13,288

Sample of Lower Kittanning coal taken in 1905 by inspector J. W. Groves of the United States Geological Survey in No. 10 mine, Superior Coal Co., northwest Section 13, Milton Township, Jackson County. Sample taken 800 feet southwest of opening, south side of mine. Analysis by the United States Geological Survey.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled	*Lower Kittanning*	1	2
Pyrite, sampled			⅛
Coal, sampled		1	1
Coal, horny, excluded			1½
Coal, sampled			5
Clay, excluded			1¼
Coal, sampled			4
Coal, horny, excluded			2½
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	9.38	0.00
Volatile matter	36.74	40.54
Fixed carbon	46.26	51.05
Ash	7.62	8.41
	100.00	100.00
Sulphur	4.08	4.50
Air drying loss 5.6 per cent		
Heating value — Calories	6,610	7,294
Heating value — B. t. u.	11,898	13,129

Another sample was cut in this mine by the same organization in the same year, 800 feet northeast of opening, north side of mine. The results are given below:

		Ft.	In.
Shale, roof.			
Coal, sampled	*Lower Kittanning*	2	3
Coal, horny, excluded			1¼
Coal, excluded			5
Clay, excluded			1
Coal, sampled			4
Clay, floor.			

[1]United States Geological Survey, Bull. 290, pp. 140, 142.

Proximate analysis

	As received	Moisture free
Moisture	8.95	0.00
Volatile matter	37.82	41.54
Fixed carbon	43.89	48.20
Ash	9.34	10.26
	100.00	100.00
Sulphur	4.41	4.84

Air drying loss 5.3 per cent

Sample of Lower Kittanning coal cut in 1907 by D. D. Condit in mine No. 11, Superior Coal Co., southeast Section 24, Milton Township, Jackson County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay		3	0
Coal, bony, rejected	*Lower Kittanning*	1	1
Coal, upper bench, sampled		2	3
Shale, dark, rejected			1
Coal, middle bench, sampled			5
Clay, rejected			2
Coal, lower bench, sampled			3
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	8.39	0.00
Volatile matter	35.18	38.40
Fixed carbon	49.01	53.50
Ash	7.42	8.10
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.63	72.73
Hydrogen	5.47	4.96
Oxygen	16.46	9.82
Nitrogen	1.37	1.50
Sulphur	2.65	2.89
Ash	7.42	8.10
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,772	7,392
	B. t. u.	12,189	13,306

Sample of Lower Kittanning coal cut in 1907 by D. D. Condit, Mine No. 2, Halley Coal Co., one-half mile south of Etna Junction, central Elizabeth Township, Lawrence County. Sample 5 by 3 inches and from a fresh face. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, soft		2	6
Coal, bony, rejected	*Lower Kittanning*		7½
Coal, middle bench, sampled		2	2
Shale, gray, rejected			4
Coal, lower bench, sampled			8
Shale, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	8.07	0.00
Volatile matter	34.54	37.57
Fixed carbon	47.68	51.87
Ash	9.71	10.56
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.54	71.29
Hydrogen	5.44	4.94
Oxygen	15.95	9.55
Nitrogen	1.23	1.34
Sulphur	2.13	2.32
Ash	9.71	10.56
	100.00	100.00

Moisture in air-dried sample from 2½ to 3 per cent

		As received	Moisture free
Heating value	Calories	6,626	7,207
	B. t. u.	11,926	12,973

Sample of Lower Kittanning coal cut in 1907 by D. D. Condit, mine of John Peters, at Coal Grove, Section 2, Upper Township, Lawrence County. Sample dry, 5 by 3 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, soft		15	0
Coal, shaly, sampled	*Lower Kittanning*		8¾
Shale, rejected			1
Coal, upper bench, sampled			5
Pyrite, sampled			¼
Coal, middle bench, sampled			1 5/8
Shale, gray, rejected			8¾
Coal, lower bench, sampled			9
Shale, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	7.57	0.00
Volatile matter	38.51	41.66
Fixed carbon	45.13	48.83
Ash	8.79	9.51
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.71	72.18
Hydrogen	5.59	5.14
Oxygen	14.44	8.34
Nitrogen	1.27	1.37
Sulphur	3.20	3.46
Ash	8.79	9.51
	100.00	100.00

Moisture in air-dried sample from 2½ to 3 per cent

		As received	Moisture free
Heating value	Calories	6,777	7,332
	B. t. u.	12,199	13,197

STRASBURG COAL

The Strasburg coal belongs above the Oak Hill clay horizon. The bed is thin or wanting in most of southern and central Ohio. In the Strasburg area of Tuscarawas County and in adjacent areas of Carroll and Stark the bed thickens to 1 foot or more and lies 10 to 20 feet above the Lower Kittanning coal. It is mined only incidentally in mining clay.

MIDDLE KITTANNING OR No. 6 COAL

From the standpoint of quantity and quality the Middle Kittanning is the most important coal bed of Ohio. It outcrops from the Ohio-Pennsylvania State line in Columbiana County southwest to the Ohio River, which it reaches in Lawrence County, and from there crosses into Kentucky. The coal is noted for its persistency, being of workable thickness in every county where it outcrops, and in many of these it is mined in a large way. Among the very important mining centers based on this fuel may be mentioned Tuscarawas, Coshocton, and Muskingum counties, and the great Hocking Valley field in Perry, Hocking, and Athens counties.

Normally the Middle Kittanning coal consists of three benches of varying thickness separated by layers of shale or clay which also vary from place to place. As a rule the bed where mined ranges from 3 to 5 feet in thickness. Thus in Tuscarawas County 16 samples taken from mines in various parts of the county averaged 3 feet 7 inches; in Coshocton County 11 samples averaged 3 feet 2 inches; while in Muskingum County Stout places the average of marketable coal at 3 feet 1 inch, this being made on more than 100 measurements. The coal is at its best in the Hocking Valley field where in southern Perry County its thickness attains the great figure of 15 feet. Concerning the coal in this field Dr. Orton says:[1]

> "In structure the Hocking Valley coal always has the three benches of the normal Middle Kittanning seam, with some addition of its own. In other words, the Great Vein consists of the normal three-bench seam of Middle Kittanning age, covered and reinforced by a Hocking Valley supplementary seam, the latter consisting of one or two or more benches. . . . It has a maximum thickness of 10 feet. All the thickness of the Hocking Valley seam in excess of 6 feet, and in many parts of the field all in excess of 4½ feet, is to be credited to the supplementary seam."

Dr. Orton gave the area of the Hocking Valley field as 94,000 acres, but drilling by F. A. Ray has materially enlarged the field especially to the south and east. The greatest departure from the normal structure is along the northeast border where the "faulted" area occurs. (Map 3.) There the coal is cut out by sandstone or other rock, the work of streams which swept away the accumulated

[1]Geological Survey Ohio, Vol. V., pp. 921, 922.

plant material and deposited in its place sand or mud. Lack of definite knowledge as to the location and extent of this "fault" has caused heavy financial losses to mining companies.

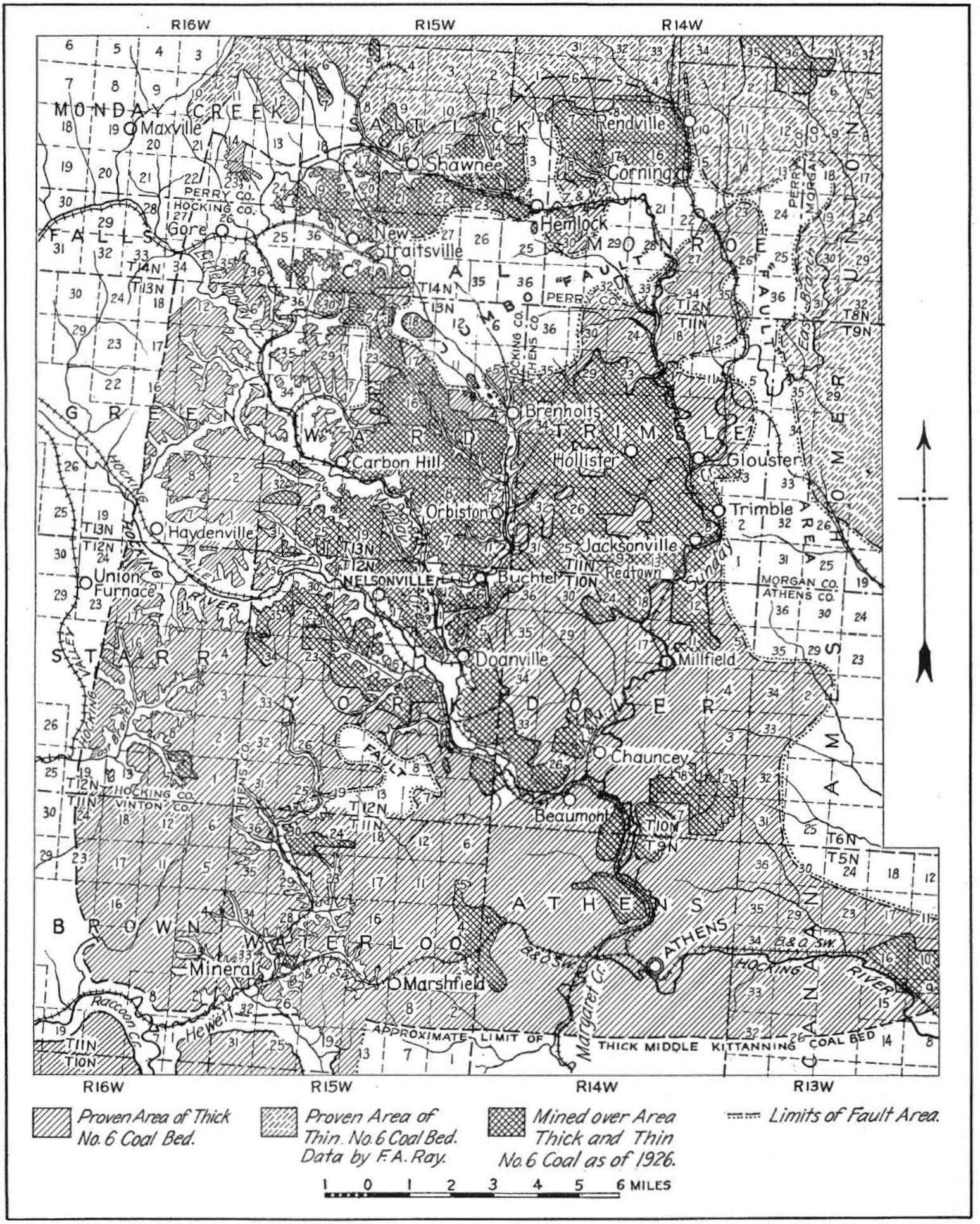
South of the Hocking Valley field the coal bed is of less importance. Thus in Vinton County the one important deposit of this coal is in Brown Township where it averages 3 feet 8 inches, although Stout rates only 2 feet 9 inches of this clean coal. The area of this bed in Jackson County is about 35 square miles but so far as known the bed is thin, rarely attaining 2 feet 6 inches, and it does not give promise of becoming important for a long time. Lawrence County makes a still poorer showing, the best deposit being near Sheridan on the Ohio River where the bed has long been mined.

The extent to which the Middle Kittanning coal is present under cover is not definitely known. Within the past 25 years much work has been done by individuals and corporations but the results have not been placed at the disposal of the Survey. Oil and gas drillers frequently report heavy beds of coal but as a rule their data are unreliable. At the village of Canaanville in the Hocking Valley about seven miles east of Athens, the Middle Kittanning coal is mined from a depth of more than 400 feet. As measured in the air shaft it was 433 feet 10 inches to the top of the coal which was there reported to be 9 feet 4 inches thick. Doubtless other lenses of this bed will be found under heavy cover in eastern Ohio.

In fact two test wells drilled in Salem Township, Washington County, showed 5 feet 8 inches and 4 feet 5½ inches of this coal, and one near Bellaire, Belmont County, recorded 4 feet 1 inch. At the latter place the top of the coal is 533 feet 6 inches below the surface and 563 feet 6 inches below the Pittsburgh bed. These tests were made under the direction of F. A. Ray.

A century ago coal from the Hocking Valley field was shipped north by canal, but the market was small. In 1869 the Hocking Valley Railway was completed as far as Columbus, and in 1880 the Toledo and Ohio Central Railroad. These gave an outlet to Columbus, and when a few years later these lines were extended to Toledo the market for the coal was greatly extended, and the Hocking Valley field became one of the largest producers in the United States.

The Middle Kittanning coal is strong and hence mines with a small percentage of dust or fine material. It is open burning, and being low in sulphur and moderate in ash, was formerly used in the raw state in the Hocking Valley district for making pig iron. Now as heretofore its great use is for general heating and steam generation. For these purposes it must be accorded high rating. Its structure, thickness, composition, and heating value are well shown in the 86 sections and analyses which follow.



MAP OF THE HOCKING VALLEY FIELD OF MIDDLE KITTANNING, NO. 6 COAL

The position of the Middle Kittanning coal with reference to other beds in the Allegheny series is shown in the following records:

Southeast Ohio

Vinton County, Madison Township, Section 16[1]

		Ft.	In.
Clay shale, red, horizon of *Upper Freeport* coal		3	0
Shale and covered		2	0
Clay, light, *Bolivar*		2	0
Sandstone, shaly		3	0
Shale and covered		22	0
Clay shale and covered		3	0
Limestone, nodular, fresh water, *Lower Freeport*		1	0
Clay, calcareous, light to dark		4	0
Sandstone, massive, soft		43	0
Shale, dark, part bony		1	0
Shale, gray		8	0
Coal blossom *Middle Kittanning*		1	0
Shale and covered		14	0
Clay, plastic, dark	*Oak Hill*	1	0
Clay, with impure limestone nodules	*Oak Hill*	1	0
Clay, plastic, light	*Oak Hill*	3	0
Shale, shaly sandstone, and covered		17	0
Coal blossom, *Lower Kittanning*		1	0

Northeast Ohio

Jefferson County, Saline Township, Section 13[2]

	Ft.	In.
Coal, *Upper Freeport* or *Diamond*	3	6
Sandstone, shale, and covered	57	0
Shale, black	1	0
Coal, *Lower Freeport* or *Rogers*	2	8
Sandstone, shale, and covered	55	0
Shale, black	5	0
Shale, pyritiferous		1
Coal, *Middle Kittanning* or *Strip Vein*	2	6
Clay, siliceous	5	0
Shale	17	0
Coal, *Lower Kittanning* or *Creek Vein*	2	6

Sections and analyses

Sample of Middle Kittanning coal cut in 1907 by D. D. Condit in mine of John D. Smith, Washingtonville, Green Township, Mahoning County. Sample 6 by 4 inches. Analysis by Lord and Somermeier.

[1]Stout, Wilber, Geol. Survey Ohio, Bull. 31, p. 309.
[2]Stout, Wilber, Geol. Survey Ohio, Bull. 28, p. 169.

		Ft.	In.
Shale with kidney ore.			
Coal, bony, rejected	*Middle Kittanning*	1	7
Coal, sampled			10
Clay, plastic.			
Limestone.			

Proximate analysis

	As received	Moisture free
Moisture	5.23	0.00
Volatile matter	36.86	38.89
Fixed carbon	53.19	56.13
Ash	4.72	4.98
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	73.84	77.91
Hydrogen	5.50	5.19
Oxygen	12.36	8.14
Nitrogen	1.41	1.49
Sulphur	2.17	2.29
Ash	4.72	4.98
	100.00	100.00

Heating value	As received	Moisture free
Calories	7,502	7,916
B. t. u.	13,504	14,249

Sample of Middle Kittanning coal cut in 1921 by C. F. Moses in mine of J. A. Stouffer, just east of Washingtonville, southwest Section 36, Green Township, Mahoning County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, with ore nodules		8	4
Shale, dark, bony, fossiliferous, *Washingtonville*		3	0
Shale, dark, fissile, siliceous		3	8
Coal, bony, rejected	*Middle Kittanning*	2	$1\frac{1}{2}$
Coal, good, sampled			1
Clay, siliceous		3	0

Proximate analysis

	As received	Moisture free
Moisture	5.04	0.00
Volatile matter	40.14	42.27
Fixed carbon	51.31	54.03
Ash	3.51	3.70
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	74.14	78.07
Hydrogen	5.42	5.13
Oxygen	14.46	10.49
Nitrogen	1.41	1.49
Sulphur	1.06	1.12
Ash	3.51	3.70
	100.00	100.00

Heating value	As received	Moisture free
Calories	7,426	7,819
B. t. u.	13,366	14,075

Fusion of ash	
Incipient	2,478°F.
Complete	2,580°F.

Sample of Middle Kittanning coal cut in 1916 by J. H. Hance from the Duck coal bank, southeast Section 36, Liverpool Township, Columbiana County. Analysis by United States Bureau of Mines.[1]

		Ft.	In
Shale and bony coal.			
Coal, bony, rejected	*Middle Kittanning*	1	4
Coal, sampled			7½
Clay, rejected			2¼
Coal, sampled			2½

Proximate analysis

	As received	Moisture free
Moisture	5.08	0.00
Volatile matter	35.78	37.69
Fixed carbon	53.15	56.00
Ash	5.99	6.31
	100.00	100.00
Sulphur	2.07	2.18
Air drying loss 2.7 per cent		
Heating value—Calories	7,412	7,809
Heating value—B. t. u.	13,342	14,056

Sample of Middle Kittanning coal cut in 1916 by J. H. Hance in the Delaney coal bank, southwest Section 36, Liverpool Township, Columbiana County. Analysis by United States Bureau of Mines.[1]

		Ft.	In.
Coal, bony, roof.			
Coal, bony, rejected	*Middle Kittanning*	1	4
Coal, sampled			6
Clay, rejected			2
Coal, sampled			5

Proximate analysis

	As received	Moisture free
Moisture	4.33	0.00
Volatile matter	36.75	38.41
Fixed carbon	54.31	56.77
Ash	4.61	4.82
	100.00	100.00
Sulphur	1.46	1.53
Air drying loss 1.7 per cent		

[1]United States Bureau of Mines, Bull. 193, pp. 49, 200.

		As received	Moisture free
Heating value	Calories	7,589	7,933
	B. t. u.	13,660	14,279

Sample of Middle Kittanning coal cut in 1907 by D. D. Condit from mine of W. J. Blackford, at the mouth of Dry Run, near East Liverpool, east central Section 35, Liverpool Township, Columbiana County. Sample 7 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, dirty, rejected	*Middle Kittanning*	1	4
Coal, sampled			6
Shale, rejected			3
Coal, impure, sampled			4
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	3.60	0.00
Volatile matter	36.16	37.51
Fixed carbon	55.64	57.72
Ash	4.60	4.77
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	77.06	79.94
Hydrogen	5.46	5.25
Oxygen	9.74	6.78
Nitrogen	1.38	1.43
Sulphur	1.76	1.83
Ash	4.60	4.77
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,789	8,080
	B. t. u.	14,020	14,544

Sample of Middle Kittanning coal cut in 1916 by J. H. Hance from the Johnson coal bank, middle of Section 33, Liverpool Township, Columbiana County. Analysis by United States Bureau of Mines.[1]

		Ft.	In.
Sandstone roof.			
Coal, bony, with some coal, excluded.	*Middle Kittanning*	1	1¼
Coal, sampled			5
Clay, excluded			1
Coal, sampled			4½
Clay, sampled			¼
Coal, sampled			4½
Clay floor.			

[1]United States Bureau of Mines, Bull. 193, pp. 49, 201.

Proximate analysis

	As received	Moisture free
Moisture	4.79	0.00
Volatile matter	34.83	36.58
Fixed carbon	52.95	55.62
Ash	7.43	7.80
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	73.99	77.71
Hydrogen	5.39	5.10
Oxygen	10.02	6.06
Nitrogen	1.38	1.45
Sulphur	1.79	1.88
Ash	7.43	7.80
	100.00	100.00

Air drying loss 2.7 per cent

		As received	Moisture free
Heating value	Calories	7,329	7,698
	B. t. u.	13,192	13,856

Sample of Middle Kittanning coal cut in 1916 by J. H. Hance from the mine of the Wooster Fire Clay Co. at Wellsville, Section 9, Yellow Creek Township, Columbiana County. Analysis by United States Bureau of Mines.[1]

		Ft.	In.
Shale, not measured.			
Clay, black, excluded			1
Coal, sampled	*Middle Kittanning*	2	4
Coal, bony, excluded	*Middle Kittanning*		¾

Proximate analysis

	As received	Moisture free
Moisture	3.41	0.00
Volatile matter	34.66	35.88
Fixed carbon	51.18	52.99
Ash	10.75	11.13
	100.00	100 00

Ultimate analysis

	As received	Moisture free
Carbon	71.62	74.15
Hydrogen	5.22	5.01
Oxygen	10.26	7.49
Nitrogen	1.45	1.50
Sulphur	0.70	0.72
Ash	10.75	11.13
	100.00	100.00

Air drying loss 1.2 per cent

		As received	Moisture free
Heating value	Calories	7,128	7,380
	B. t. u.	12,830	13,284

Sample of Middle Kittanning coal cut in 1916 by J. H. Hance from Cream City mine at Cream City, northeast Section 25, Saline Township, Jefferson County. Analysis by United States Bureau of Mines.[2]

[1]United States Bureau of Mines, Bull. 193, pp. 50, 206.
[2]United States Bureau of Mines, Bull. 193, pp. 51, 207.

	Ft.	In.
Roof, chocolate-colored shale.		
Coal, sampled, *Middle Kittanning*	2	4½
Floor, clay.		

Proximate analysis

	As received	Moisture free
Moisture	2.64	0.00
Volatile matter	36.75	37.75
Fixed carbon	49.46	50.80
Ash	11.15	11.45
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.04	72.97
Hydrogen	5.26	5.10
Oxygen	8.99	6.82
Nitrogen	1.49	1.53
Sulphur	2.07	2.13
Ash	11.15	11.45
	100.00	100.00

Air drying loss 0.7 per cent

		As received	Moisture free
Heating value	Calories	7,158	7,352
	B. t. u.	12,884	13,234

Sample of Middle Kittanning coal cut in 1907 by D. D. Condit from mine of J. W. Stout, at the southwest edge of Alliance, northeast Section 35, Lexington Township, Stark County. Sample 6 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, bony, rejected	*Middle Kittanning*		1
Coal, sampled			4½
Pyrite, rejected			½
Coal, sampled			5
Pyrite, persistent, rejected			1½
Coal, sampled		1	9
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	5.99	0.00
Volatile matter	39.05	41.54
Fixed carbon	50.14	53.33
Ash	4.82	5.13
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.82	76.39
Hydrogen	5.56	5.21
Oxygen	12.86	8.02
Nitrogen	1.33	1.41
Sulphur	3.61	3.84
Ash	4.82	5.13
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,314	7,780
	B. t. u.	13,165	14,004

Sample of Middle Kittanning coal cut in 1907 by D. D. Condit from McGinty mine of the Louisville Brick and Tile Co., Section 24, Nimishillen Township, Stark County. Sample 6 by 3 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale and nodular ore		2	0
Coal, sampled	*Middle Kittanning*		10
Clay, rejected	*Middle Kittanning*		1½
Coal, sampled	*Middle Kittanning*	1	10
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	5.65	0.00
Volatile matter	38.51	40.82
Fixed carbon	45.76	48.50
Ash	10.08	10.68
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.92	70.93
Hydrogen	5.29	4.94
Oxygen	12.39	7.81
Nitrogen	1.19	1.26
Sulphur	4.13	4.38
Ash	10.08	10.68
	100.00	100 00

		As received	Moisture free
Heating value	Calories	6,868	7,279
	B. t. u.	12,362	13,102

Sample of Middle Kittanning coal cut in 1926 by T. R. Meyers and G. W. White from mine of Whitacre-Greer Fireproofing Co., southeast quarter of Section 22, Sandy Township, Stark County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, blue gray, hard.			
Coal, very bony, with pyrite streaks, rejected	*Middle Kittanning*		5
Coal, good, sampled	*Middle Kittanning*		7½
Pyrite, rejected	*Middle Kittanning*		1½
Coal, good, sampled	*Middle Kittanning*	1	8
Clay, plastic, used at plant.			

Proximate analysis

	As received	Moisture free
Moisture	6.49	0.00
Volatile matter	40.26	43.05
Fixed carbon	46.64	49.88
Ash	6.61	7.07
	100.00	100.00
Sulphur	1.93	2.07

Air drying loss 2.7 per cent

		As received	Moisture free
Heating value	Calories	6,942	7,423
	B. t. u.	12,495	13,362

Sample of Middle Kittanning coal cut in 1907 by D. D. Condit from mine No. 6 of Whitacre Fire Proofing Co., at Waynesburg, southeast Section 22, Sandy Township, Stark County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, sampled	*Middle Kittanning*	1	1
Clay and pyrite, rejected	*Middle Kittanning*	1	1½
Coal, sampled	*Middle Kittanning*	1	8½
Fire clay.			

Proximate analysis

	As received	Moisture free
Moisture	6.66	0.00
Volatile matter	36.24	38.82
Fixed carbon	48.88	52.37
Ash	8.22	8.81
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.94	73.86
Hydrogen	5.37	4.96
Oxygen	13.61	8.24
Nitrogen	1.20	1.28
Sulphur	2.66	2.85
Ash	8.22	8.81
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,977	7,475
	B. t. u.	12,559	13,455

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Somers Coal Co., near Sherrodsville, southeast Section 13, Orange Township, Carroll County. Sample about 20 by 3 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled	*Middle Kittanning*	1	8
Pyrite, rejected	*Middle Kittanning*		1½
Coal, lower bench, sampled	*Middle Kittanning*	2	4
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	3.76	0.00
Volatile matter	39.11	40.64
Fixed carbon	50.34	52.31
Ash	6.79	7.05
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.99	74.80
Hydrogen	5.36	5.13
Oxygen	11.40	8.38
Nitrogen	1.40	1.46
Sulphur	3.06	3.18
Ash	6.79	7.05
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,238	7,521
	B. t. u.	13,028	13,537

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Tuscarawas Coal and Iron Co., near center of Sandy Township, one and one-half miles northwest of Mineral City, Tuscarawas County. Sample about 19 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Soapstone.			
Coal, upper bench, sampled.....	*Middle Kittanning*	1	10
Pyrite, rejected.....			1
Coal, lower bench, sampled.....		2	2
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture.....	4.92	0.00
Volatile matter.....	38.13	40.10
Fixed carbon.....	49.91	52.50
Ash.....	7.04	7.40
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	70.45	74.10
Hydrogen.....	5.40	5.11
Oxygen.....	12.92	8.99
Nitrogen.....	1.28	1.34
Sulphur.....	2.91	3.06
Ash.....	7.04	7.40
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,082	7,448
	B. t. u.	12,748	13,406

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Valentine Lieser, southeast quarter of Section 24, Lawrence Township, Tuscarawas County. Sample about 18 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale.....		17	0
Coal, upper bench, sampled.....	*Middle Kittanning*	2	1
Pyrite, rejected.....			½
Coal, middle bench, sampled.....			5
Shale, rejected.....			½
Coal, lower bench, sampled.....			5
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	4.69	0.00
Volatile matter	39.57	41.53
Fixed carbon	46.68	48.97
Ash	9.06	9.50
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.59	70.92
Hydrogen	5.30	5.01
Oxygen	12.11	8.33
Nitrogen	1.24	1.30
Sulphur	4.70	4.94
Ash	9.06	9.50
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,881	7,220
	B. t. u.	12,386	12,996

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Somerdale Coal Co., east central Section 8, Fairfield Township, Tuscarawas County. Sample about 10 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale		10	0
Coal, upper bench, sampled	*Middle Kittanning*	1	11
Pyrite, rejected			1
Coal, lower bench, sampled		1	9
Pyrite, rejected			1
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	4.66	0.00
Volatile matter	39.25	41.17
Fixed carbon	49.87	52.31
Ash	6.22	6.52
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.80	74.26
Hydrogen	5.48	5.21
Oxygen	12.94	9.23
Nitrogen	1.28	1.34
Sulphur	3.28	3.44
Ash	6.22	6.52
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,097	7,444
	B. t. u.	12,775	13,399

Sample of Middle Kittanning coal cut in 1907 by D. D. Condit from mine of Somerdale Coal Co., near Somerdale, northeast Section 8, Fairfield Township, Tuscarawas County. Sample 6 by 3 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale with nodular ore.			
Bone coal and pyrite, rejected	*Middle Kittanning*		9
Coal, sampled		1	1
Coal and pyrite, rejected			6
Coal, sampled			9
Clay and pyrite, rejected			1
Coal, sampled			8½
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	7.15	0.00
Volatile matter	38.34	41.29
Fixed carbon	49.95	53.80
Ash	4.56	4.91
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.29	76.78
Hydrogen	5.64	5.22
Oxygen	14.66	8.95
Nitrogen	1.23	1.32
Sulphur	2.62	2.82
Ash	4.56	4.91
	100.00	100.00

Heating value	As received	Moisture free
Calories	7,194	7,748
B. t. u.	12,949	13,946

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Joseph Shilling, located north of the Tuscarawas River, one-half mile southeast of the Dover-Fairfield township line, Dover Township, Tuscarawas County. Sample 14 by 6 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, upper bench, sampled	*Middle Kittanning*	2	3
Pyrite, rejected			2
Coal, lower bench, sampled		1	3

Proximate analysis

	As received	Moisture free
Moisture	4.94	0.00
Volatile matter	36.20	38.08
Fixed carbon	49.36	51.93
Ash	9.50	9.99
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.54	71.07
Hydrogen	5.14	4.83
Oxygen	12.33	8.33
Nitrogen	1.30	1.37
Sulphur	4.19	4.41
Ash	9.50	9.99
	100.00	100.00

Heating value	As received	Moisture free
Calories	6,856	7,214
B. t. u.	12,341	12,985

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Timothy Sewell, located one mile southwest of Dover, Dover Township, Tuscarawas County. Sample about 12 by 7 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale		12	0
Bone coal, rejected	*Middle Kittanning*	2	5
Coal, upper bench, sampled			5
Clay, rejected			1
Coal, lower bench, sampled		1	0
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	3.52	0.00
Volatile matter	40.25	41.72
Fixed carbon	50.22	52.05
Ash	6.01	6.23
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.13	74.76
Hydrogen	5.41	5.20
Oxygen	12.00	9.19
Nitrogen	1.28	1.33
Sulphur	3.17	3.29
Ash	6.01	6.23
	100.00	100.00

Heating value	As received	Moisture free
Calories	7,297	7,563
B. t. u.	13,135	13,613

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of East Goshen Coal Co., eastern Section 12, Goshen Township, Tuscarawas County. Sample about 14 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Soapstone.			
Coal, upper bench, sampled	*Middle Kittanning*	2	2
Clay, rejected			1½
Coal, middle bench, sampled		1	0
Clay, rejected			2½
Coal, lower bench, sampled		1	3
Clay, plastic.			

Proximate analysis

	As received	Moisture free
Moisture	3.51	0.00
Volatile matter	41.60	43.11
Fixed carbon	47.20	48.92
Ash	7.69	7.97
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.26	72.82
Hydrogen	5.45	5.24
Oxygen	10.82	7.98
Nitrogen	1.22	1.26
Sulphur	4.56	4.73
Ash	7.69	7.97
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,153	7,413
	B. t. u.	12,875	13,343

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of American Sheet Steel Co., northwest quarter of Section 31, Union Township, Tuscarawas County. Sample about 15 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Clay shale, soft.....		3	0
Coal, upper bench, sampled.....	*Middle Kittanning*	2	0
Pyrite, rejected.....			2
Coal, middle bench, sampled.....		1	0
Clay, rejected.....			½
Coal, lower bench, sampled.....			11
Clay.			

Proximate analysis

	As received	Moisture free
Moisture.....	3.81	0.00
Volatile matter.....	38.71	40.24
Fixed carbon.....	51.47	53.51
Ash.....	6.01	6.25
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	72.30	75.16
Hydrogen.....	5.41	5.19
Oxygen.....	11.68	8.63
Nitrogen.....	1.36	1.41
Sulphur.....	3.24	3.36
Ash.....	6.01	6.25
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,306	7,595
	B. t. u.	13,151	13,671

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Midvale-Goshen Coal Co., northwest corner of Section 10, Warwick Township, Tuscarawas County. Sample about 12 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, soft.			
Bone coal, rejected.....	*Middle Kittanning*		9
Coal, upper bench, sampled.....		1	9
Clay, rejected.....			½
Coal, middle bench, sampled.....			7
Clay, rejected.....			2½
Coal, lower bench, sampled.....		1	8
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	4.10	0.00
Volatile matter	41.64	43.42
Fixed carbon	49.05	51.15
Ash	5.21	5.43
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.45	75.55
Hydrogen	5.57	5.34
Oxygen	12.10	8.82
Nitrogen	1.42	1.48
Sulphur	3.25	3.38
Ash	5.21	5.43
	100.00	100.00

Heating value		As received	Moisture free
	Calories	7,331	7,644
	B. t. u.	13,196	13,759

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from West Goshen mine of the West Goshen Coal Co., northwest Section 24, York Township, Tuscarawas County. Sample about 14 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled		2	7
Clay, rejected			2
Coal, middle bench, sampled	*Middle Kittanning*		7
Clay, rejected			2
Coal, lower bench, sampled		1	5
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	3.18	0.00
Volatile matter	43.56	44.99
Fixed carbon	46.33	47.85
Ash	6.93	7.16
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.13	73.46
Hydrogen	5.50	5.32
Oxygen	11.04	8.49
Nitrogen	1.28	1.32
Sulphur	4.12	4.25
Ash	6.93	7.16
	100.00	100.00

Heating value		As received	Moisture free
	Calories	7,305	7,545
	B. t. u.	13,149	13,581

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Jacob Groh, northeast quarter of Section 17, Auburn Township, Tuscarawas County. Sample about 16 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Slate.			
Coal, rejected			2½
Shale, rejected			2
Coal, upper bench, sampled		2	6
Clay, rejected	*Middle Kittanning*		1
Coal, middle bench, sampled			5
Pyrite, rejected			2
Coal, lower bench, sampled			5
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	4.30	0.00
Volatile matter	40.07	41.87
Fixed carbon	48.00	50.16
Ash	7.63	7.97
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.39	72.51
Hydrogen	5.41	5.15
Oxygen	12.32	8.88
Nitrogen	1.28	1.34
Sulphur	3.97	4.15
Ash	7.63	7.97
	100.00	100.00

Heating value		As received	Moisture free
	Calories	7,001	7,316
	B. t. u.	12,602	13,169

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of A. J. Hawk, southeast Section 13, Jefferson Township, Tuscarawas County. Analysis by Lord and Somermeier.

	Ft.	In.
Sandstone.		
Shale.		
Coal, sampled, *Middle Kittanning*	2	8
Fire clay.		

Proximate analysis

	As received	Moisture free
Moisture	4.72	0.00
Volatile matter	40.30	42.30
Fixed carbon	49.51	51.96
Ash	5.47	5.74
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.08	74.60
Hydrogen	5.53	5.26
Oxygen	12.55	8.77
Nitrogen	1.32	1.38
Sulphur	4.05	4.25
Ash	5.47	5.74
	100.00	100.00

Heating value		As received	Moisture free
	Calories	7,199	7,555
	B. t. u.	12,958	13,599

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from Troyer & Co. mine, northeast quarter of Section 5, Bucks Township, Tuscarawas County. Sample about 16 by 4 inches. Analysis by Lord and Somermeier.

	Ft.	In.
Sandstone.		
Shale	15	0
Coal, sampled, *Middle Kittanning*	2	11
Clay, impure.		

Proximate analysis

	As received	Moisture free
Moisture	5.19	0.00
Volatile matter	40.79	43.02
Fixed carbon	48.15	50.79
Ash	5.87	6.19
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.12	73.95
Hydrogen	5.59	5.29
Oxygen	13.51	9.40
Nitrogen	1.36	1.43
Sulphur	3.55	3.74
Ash	5.87	6.19
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,122	7,517
	B. t. u.	12,820	13,522

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Cyrus Kilpatrick, located one-half mile southwest of Newport in Section 1, Mill Township, Tuscarawas County. Sample about 15 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale and sandstone.			
Coal, sampled			6
Clay, rejected			½
Coal, middle bench, sampled	*Middle Kittanning*	1	4
Pyrite, rejected			2
Coal, lower bench, sampled		1	2
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	3.78	0.00
Volatile matter	38.27	39.77
Fixed carbon	49.53	51.48
Ash	8.42	8.75
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.31	73.07
Hydrogen	5.26	5.03
Oxygen	10.96	7.90
Nitrogen	1.22	1.27
Sulphur	3.83	3.98
Ash	8.42	8.75
	100.00	100.00

		As received	Moisture free
Heating value...	Calories	7,101	7,380
	B. t. u.	12,782	13,284

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Solomon Stocker, one mile southeast of Gnadenhutten, Clay Township, Tuscarawas County. Sample about 18 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, dirty, rejected	*Middle Kittanning*		9
Coal, upper bench, sampled		2	4
Pyrite, rejected			1
Coal, middle bench, sampled			9
Pyrite, rejected			2
Coal, lower bench, sampled			4
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	3.41	0.00
Volatile matter	39.73	41.14
Fixed carbon	47.48	49.15
Ash	9.38	9.71
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.77	71.20
Hydrogen	5.23	5.02
Oxygen	10.44	7.67
Nitrogen	1.30	1.35
Sulphur	4.88	5.05
Ash	9.38	9.71
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,971	7,217
	B. t. u.	12,548	12,991

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Jacob Stonebrook, one-half mile northwest of Glasgow, Salem Township, Tuscarawas County. Sample about 20 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, sampled	*Middle Kittanning*	1	0
Clay, rejected			$\frac{1}{2}$
Coal, sampled		1	0
Coal, dirty, and pyrite, rejected			4
Coal, sampled			3
Coal with pyrite, sampled			6
Coal, sampled			4
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	3.45	0.00
Volatile matter	40.02	41.45
Fixed carbon	48.86	50.61
Ash	7.67	7.94
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.02	72.52
Hydrogen	5.30	5.09
Oxygen	10.53	7.74
Nitrogen	1.26	1.30
Sulphur	5.22	5.41
Ash	7.67	7.94
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,135	7,390
	B. t. u.	12,843	13,302

Sample of Middle Kittanning coal taken in 1928 by W. S. Glock and L. O. Naffziger from mine of Young & Co., in southwest part of Section 24, German Township, Holmes County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, carbonaceous, roof.			
Coal, bony, rejected	*Middle Kittanning*	2	1¼
Coal, sampled			4
Clay, gray, siliceous			7
Clay, light, plastic, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.84	0.00
Volatile matter	40.29	42.79
Fixed carbon	48.60	51.61
Ash	5.27	5.60
	100.00	100.00
Sulphur	2.65	2.82

Air drying loss 1.46 per cent

Heating value	Calories	7,093	7,533
	B. t. u.	12,767	13,559
Fusion of ash	Incipient	2,152°F.	
	Complete	2,402°F.	

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Michael Zahnder, one mile northwest of Shanesville, northeast corner Section 4, south, Walnut Creek Township, Holmes County. Sample 14 by 7 inches. Analysis by Lord and Somermeier.

	Ft.	In.
Shale, siliceous.		
Coal, sampled, *Middle Kittanning*	2	6
Clay, plastic.		

Proximate analysis

	As received	Moisture free
Moisture	7.31	0.00
Volatile matter	34.92	37.68
Fixed carbon	53.56	57.78
Ash	4.21	4.54
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.62	76.19
Hydrogen	5.42	4.97
Oxygen	17.31	11.66
Nitrogen	1.44	1.56
Sulphur	1.00	1.08
Ash	4.21	4.54
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,952	7,500
	B. t. u.	12,514	13,500

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of John S. Baker, northwest quarter of Section 4, Crawford Township, Coshocton County. Sample 14 by 6 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, soft.			
Shale.			
Coal, upper bench, sampled	*Middle Kittanning*	2	6
Clay, rejected			2
Coal, lower bench, sampled			7
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	4.70	0.00
Volatile matter	39.20	41.13
Fixed carbon	44.81	47.02
Ash	11.29	11.85
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.78	67.97
Hydrogen	5.23	4.94
Oxygen	11.98	8.18
Nitrogen	1.12	1.18
Sulphur	5.60	5.88
Ash	11.29	11.85
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,594	6,919
	B. t. u.	11,869	12,454

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of G. W. Levengood, Section 20, Clark Township, Coshocton County. Sample about 18 by 6 inches. Analysis by Lord and Somermeier.

	Ft.	In.
Sandstone.		
Shale	3	0
Coal, sampled, *Middle Kittanning*	2	5
Clay.		

Proximate analysis

	As received	Moisture free
Moisture	5.30	0.00
Volatile matter	39.08	41.27
Fixed carbon	49.47	52.24
Ash	6.15	6.49
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.59	73.48
Hydrogen	5.50	5.18
Oxygen	13.92	9.74
Nitrogen	1.12	1.18
Sulphur	3.72	3.93
Ash	6.15	6.49
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,084	7,480
	B. t. u.	12,751	13,464

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Young Brothers, south central Section 1, Adams Township, Coshocton County. Sample 30 by 4 inches. Analysis by Lord and Somermeier.

	Ft.	In.
Sandstone.		
Shale	20	0
Coal, sampled, *Middle Kittanning*	2	4
Clay.		

Proximate analysis

	As received	Moisture free
Moisture	4.58	0.00
Volatile matter	39.18	41.06
Fixed carbon	47.49	49.77
Ash	8.75	9.17
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.51	70.75
Hydrogen	5.40	5.12
Oxygen	11.74	8.04
Nitrogen	1.24	1.30
Sulphur	5.36	5.62
Ash	8.75	9.17
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,878	7,208
	B. t. u.	12,380	12,974

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Adam Miller, Section 5, White Eyes Township, Coshocton County. Sample about 15 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Clay, shaly, soft.			
Shale			6
Coal, upper bench, sampled	*Middle Kittanning*	2	9
Clay, rejected	*Middle Kittanning*		1½
Coal, lower bench, sampled	*Middle Kittanning*		11
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	5.32	0.00
Volatile matter	37.39	39.49
Fixed carbon	48.69	51.43
Ash	8.60	9.08
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.41	71.20
Hydrogen	5.32	5.00
Oxygen	13.13	8.87
Nitrogen	1.18	1.25
Sulphur	4.36	4.60
Ash	8.60	9.08
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,828	7,212
	B. t. u.	12,290	12,982

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Lewis McFarland, Section 24, White Eyes Township, Coshocton County. Sample about 14 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Clay shale, soft		5 to 12	0
Coal, dirty, rejected	*Middle Kittanning*		6
Coal, upper bench, sampled	*Middle Kittanning*	2	0
Pyrite, rejected	*Middle Kittanning*		1
Coal, middle bench, sampled	*Middle Kittanning*	1	0
Clay, rejected	*Middle Kittanning*		2
Coal, lower bench, sampled	*Middle Kittanning*	1	2
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	4.50	0.00
Volatile matter	38.73	40.55
Fixed carbon	50.80	53.20
Ash	5.97	6.25
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.94	74.28
Hydrogen	5.53	5.27
Oxygen	12.63	9.04
Nitrogen	1.30	1.36
Sulphur	3.63	3.80
Ash	5.97	6.25
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,173	7,511
	B. t. u.	12,911	13,519

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of E. McClure, near western boundary of Keene Township and one mile north of Walhonding River, Coshocton County. Sample about 24 by 5 inches. Analysis by Lord and Somermeier.

	Ft.	In.
Shale.		
Coal, sampled, *Middle Kittanning*.....	2	1
Clay.		

Proximate analysis

	As received	Moisture free
Moisture.....	5.40	0.00
Volatile matter.....	39.92	42.20
Fixed carbon.....	49.60	52.43
Ash.....	5.08	5.37
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	70.90	74.95
Hydrogen.....	5.58	5.26
Oxygen.....	14.02	9.75
Nitrogen.....	1.24	1.31
Sulphur.....	3.18	3.36
Ash.....	5.08	5.37
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,194	7,605
	B. t. u.	12,949	13,689

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Peter Henricks, Section 20, Oxford Township, Coshocton County. Sample about 24 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale.			
Coal, upper bench, sampled.....	*Middle Kittanning*	1	8
Pyrite, rejected.....			1½
Coal, lower bench, sampled.....			7
Clay.			

Proximate analysis

	As received	Moisture free
Moisture.....	4.44	0.00
Volatile matter.....	40.71	42.60
Fixed carbon.....	50.40	52.74
Ash.....	4.45	4.66
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	72.65	76.03
Hydrogen.....	5.53	5.27
Oxygen.....	12.48	8.93
Nitrogen.....	1.35	1.41
Sulphur.....	3.54	3.70
Ash.....	4.45	4.66
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,351	7,693
	B. t. u.	13,231	13,847

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of A. W. Marshall, northwest quarter of Section 17, Jackson Township, Coshocton County. Sample about 12 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale			8
Coal, upper bench, sampled	*Middle Kittanning*	2	9
Clay, rejected			1
Coal, lower bench, sampled			11
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	5.32	0.00
Volatile matter	40.93	43.23
Fixed carbon	47.45	50.12
Ash	6.30	6.65
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.29	73.18
Hydrogen	5.50	5.19
Oxygen	13.45	9.21
Nitrogen	1.24	1.31
Sulphur	4.22	4.46
Ash	6.30	6.65
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,086	7,484
	B. t. u.	12,755	13,471

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of W. J. Young, Section 24, Linton Township, Coshocton County. Sample 25 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale			10
Coal, dirty, rejected	*Middle Kittanning*	2	5
Coal, upper bench, sampled			6
Clay, rejected			2
Coal, lower bench, sampled			10
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	4.37	0.00
Volatile matter	40.97	42.84
Fixed carbon	49.30	51.55
Ash	5.36	5.61
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.34	74.60
Hydrogen	5.56	5.30
Oxygen	12.85	9.38
Nitrogen	1.28	1.34
Sulphur	3.61	3.77
Ash	5.36	5.61
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,247	7,578
	B. t. u.	13,045	13,640

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Peter Hammersley, Section 2, Linton Township, Coshocton County. Sample 16 by 7 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale.			
Coal, upper bench, sampled.....	*Middle Kittanning*	2	10
Clay, rejected.....			2
Coal, lower bench, sampled.....			6
Clay.			

Proximate analysis

	As received	Moisture free
Moisture.....	10.93	0.00
Volatile matter.....	34.00	38.17
Fixed carbon.....	48.43	54.37
Ash.....	6.64	7.46
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	63.08	70.81
Hydrogen.....	5.37	4.67
Oxygen.....	21.73	13.49
Nitrogen.....	1.15	1.29
Sulphur.....	2.03	2.28
Ash.....	6.64	7.46
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	6,133	6,885
	B. t. u.	11,039	12,393

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Best Coal Co., one mile east of Conesville, Franklin Township, Coshocton County. Sample 12 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled.....	*Middle Kittanning*	2	10
Clay, rejected.....			2
Coal, lower bench, sampled.....		1	4
Clay.			

Proximate analysis

	As received	Moisture free
Moisture.....	4.33	0.00
Volatile matter.....	41.11	42.97
Fixed carbon.....	48.97	51.19
Ash.....	5.59	5.84
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	71.42	74.65
Hydrogen.....	5.41	5.15
Oxygen.....	12.36	8.90
Nitrogen.....	1.22	1.28
Sulphur.....	4.00	4.18
Ash.....	5.59	5.84
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,269	7,598
	B. t. u.	13,084	13,676

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of Charles Fillomlee, northwest quarter of Section 23, Virginia Township, Coshocton County. Sample 24 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled.....	*Middle Kittanning*	3	0
Clay, rejected.....			1½
Coal, lower bench, sampled.....			7
Clay.			

Proximate analysis

	As received	Moisture free
Moisture.....	5.12	0.00
Volatile matter.....	38.99	41.09
Fixed carbon.....	48.87	51.51
Ash.....	7.02	7.40
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	69.49	73.24
Hydrogen.....	5.45	5.14
Oxygen.....	12.97	8.87
Nitrogen.....	1.20	1.27
Sulphur.....	3.87	4.08
Ash.....	7.02	7.40
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,066	7,447
	B. t. u.	12,719	13,405

Sample of Middle Kittanning coal cut in 1902 by B. A. Eisenlohr from mine of J. P. Patton, one mile west of Block School in southeastern part of Lafayette Township, Coshocton County. Sample 18 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale.....			3
Coal, upper bench, sampled.....	*Middle Kittanning*	2	9
Clay, rejected.....			2
Coal, lower bench, sampled.....			5
Clay.			

Proximate analysis

	As received	Moisture free
Moisture.....	5.60	0.00
Volatile matter.....	34.69	36.75
Fixed carbon.....	46.43	49.18
Ash.....	13.28	14.07
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	61.59	65.24
Hydrogen.....	4.95	4.59
Oxygen.....	14.23	9.80
Nitrogen.....	1.08	1.14
Sulphur.....	4.87	5.16
Ash.....	13.28	14.07
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,222	6,591
	B. t. u.	11,200	11,864

Sample of Middle Kittanning coal cut in 1917 by W. Stout and R. E. Lamborn from mine of W. B. Eltringham, near bridge over White Eyes Creek, Section 1, Monroe Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof		10	0
Coal, bony, excluded	*Middle Kittanning*	2	6
Coal, good, sampled			9
Shale, excluded			1
Coal, good, sampled			8
Clay, plastic, siliceous, floor		2	0

Proximate analysis

	As received	Moisture free
Moisture	5.88	0.00
Volatile matter	43.81	46.55
Fixed carbon	46.51	49.41
Ash	3.80	4.04
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.18	76.68
Hydrogen	5.74	5.41
Oxygen	14.03	9.35
Nitrogen	1.27	1.35
Sulphur	2.98	3.17
Ash	3.80	4.04
	100.00	100.00

Air drying loss 1.9 per cent

		As received	Moisture free
Heating value	Calories	7,308	7,764
	B. t. u.	13,154	13,975

Sample of Middle Kittanning coal cut in 1917 by W. Stout and R. E. Lamborn from mine of George Buker, one mile north of Otsego, central Section 8, Monroe Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale		4	0
Coal, bony, excluded			1
Shale with pyrite, excluded			2
Coal, bony, excluded	*Middle Kittanning*	2	3
Coal, good, sampled			7
Shale, excluded			1½
Coal, good, sampled			10
Clay, siliceous		2	0

Proximate analysis

	As received	Moisture free
Moisture	5.52	0.00
Volatile matter	44.73	47.34
Fixed carbon	45.12	47.76
Ash	4.63	4.90
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.90	75.04
Hydrogen	5.66	5.35
Oxygen	14.20	9.83
Nitrogen	1.11	1.18
Sulphur	3.50	3.70
Ash	4.63	4.90
	100.00	100.00

Air drying loss 1.9 per cent

		As received	Moisture free
Heating value	Calories	7,241	7,664
	B. t. u.	13,034	13,795

Sample of Middle Kittanning coal cut in 1917 by W. Stout and R. E. Lamborn from mine of C. H. Wilcox, northeast corner of Section 3, Adams Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale		3	0
Coal, bony, rejected			4
Shale, rejected			2
Coal, good, sampled	*Middle Kittanning*	1	11
Pyrite, irregular, rejected			1
Coal, good, sampled			7½
Clay shale, rejected			1½
Coal, good, sampled		1	5
Clay, plastic, siliceous		2	0

Proximate analysis

	As received	Moisture free
Moisture	5.63	0.00
Volatile matter	44.70	47.37
Fixed carbon	44.84	47.51
Ash	4.83	5.12
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.41	75.67
Hydrogen	5.69	5.37
Oxygen	13.50	9.00
Nitrogen	1.25	1.33
Sulphur	3.32	3.51
Ash	4.83	5.12
	100.00	100.00

Air drying loss 1.9 per cent

		As received	Moisture free
Heating value	Calories	7,206	7,635
	B. t. u.	12,971	13,743

Fusion of ash	Incipient	2,014°F.
	Complete	2,107°F.

Sample of Middle Kittanning coal cut in 1917 by W. Stout and R. E. Lamborn from mine of James Scott, one-half mile north of Ross School, two miles southeast of Adams Mills, Madison Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, good roof		2	0
Shale, with bony coal, rejected	*Middle Kittanning*	2	6
Coal, good, sampled			4
Shale, rejected			1½
Coal, good, sampled			8
Clay, siliceous		3	0

Proximate analysis

	As received	Moisture free
Moisture	6.13	0.00
Volatile matter	44.25	47.14
Fixed carbon	44.42	47.32
Ash	5.20	5.54
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.02	74.59
Hydrogen	5.76	5.41
Oxygen	14.16	9.28
Nitrogen	1.22	1.30
Sulphur	3.61	3.88
Ash	5.20	5.54
	100.00	100.00

Air drying loss 2.2 per cent

		As received	Moisture free
Heating value	Calories	7,108	7,572
	B. t. u.	12,794	13,629

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of E. R. Birkhimer, southeast Section 19, Madison Township, Muskingum County. Sample 24 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, soft		3	0
Coal, upper bench, sampled		2	1
Clay, rejected	*Middle Kittanning*		1½
Coal, lower bench, sampled			7
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.75	0.00
Volatile matter	39.88	41.87
Fixed carbon	46.09	48.39
Ash	9.28	9.74
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.69	70.02
Hydrogen	5.35	5.06
Oxygen	12.05	8.22
Nitrogen	1.28	1.34
Sulphur	5.35	5.62
Ash	9.28	9.74
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,854	7,196
	B. t. u.	12,337	12,952

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of E. U. Farrell, near the Fritz School on Symmes Creek at the junction of South Branch, Madison Township, Muskingum County. Sample about 20 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale.			
Coal, upper bench, sampled	*Middle Kittanning*	2	2
Clay, rejected			2
Coal, lower bench, sampled			8
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.62	0.00
Volatile matter	40.95	42.93
Fixed carbon	47.85	50.17
Ash	6.58	6.90
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.58	72.95
Hydrogen	5.47	5.20
Oxygen	12.58	8.88
Nitrogen	1.30	1.36
Sulphur	4.49	4.71
Ash	6.58	6.90
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,126	7,471
	B. t. u.	12,827	13,448

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of A. W. Smith, just north of Stringtown, southeast quarter of Section 20, Muskingum Township, Muskingum County. Sample 18 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, dirty, rejected			
Coal, upper bench, sampled		1	7
Pyrite, rejected	*Middle Kittanning*		3
Coal, middle bench, sampled			6
Clay, rejected			2
Coal, lower bench, sampled		1	6
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.55	0.00
Volatile matter	40.27	42.63
Fixed carbon	48.95	51.83
Ash	5.23	5.54
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.54	74.69
Hydrogen	5.57	5.24
Oxygen	13.77	9.36
Nitrogen	1.26	1.33
Sulphur	3.63	3.84
Ash	5.23	5.54
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,191	7,614
	B. t. u.	12,944	13,705

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of Frank Lacey, on Mill Run, one and one-half miles from its mouth, southwestern Washington Township, Muskingum County. Sample 24 by 6 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Soapstone.			
Shale			2
Coal, upper bench, sampled	*Middle Kittanning*	1	8
Pyrite, rejected	*Middle Kittanning*		2
Coal, lower bench, sampled	*Middle Kittanning*		7
Clay, siliceous, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.44	0.00
Volatile matter	39.15	41.40
Fixed carbon	46.13	48.79
Ash	9.28	9.81
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.16	71.02
Hydrogen	5.34	5.01
Oxygen	13.27	8.92
Nitrogen	1.18	1.25
Sulphur	3.77	3.99
Ash	9.28	9.81
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,822	7,214
	B. t. u.	12,280	12,985

Sample of Middle Kittanning coal taken in 1917 by W. Stout and R. E. Lamborn from mine of Frank J. Paul, west central Section 4, south Wayne Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof		8	0
Coal, bony, with shale, rejected	*Middle Kittanning*		8
Coal, good, sampled		1	9
Shale, rejected			1½
Coal, good, sampled		1	3
Clay, siliceous, floor		2	0

Proximate analysis

	As received	Moisture free
Moisture	5.93	0.00
Volatile matter	45.69	48.56
Fixed carbon	42.54	45.23
Ash	5.84	6.21
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.21	71.45
Hydrogen	5.67	5.32
Oxygen	16.33	11.76
Nitrogen	1.24	1.32
Sulphur	3.71	3.94
Ash	5.84	6.21
	100.00	100.00

Air drying loss 1.9 per cent

		As received	Moisture free
Heating value	Calories	7,067	7,512
	B. t. u.	12,721	13,522

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of Wesley Wells, south central Section 30, Harrison Township, Muskingum County. Sample 22 by 6 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale		15	0
Coal, upper bench, sampled	*Middle Kittanning*	1	1
Clay, rejected			2
Coal, lower bench, sampled		1	1
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.67	0.00
Volatile matter	40.32	42.30
Fixed carbon	45.18	47.39
Ash	9.83	10.31
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.71	71.03
Hydrogen	5.38	5.10
Oxygen	11.82	8.05
Nitrogen	1.16	1.21
Sulphur	4.10	4.30
Ash	9.83	10.31
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,873	7,210
	B. t. u.	12,371	12,978

Sample of Middle Kittanning coal taken by B. A. Eisenlohr in 1902 from mine of Walnut Hill Coal Co., north central Section 13, Brush Creek Township, Muskingum County. Sample 13 by 7 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale		20	0
Coal, upper bench, sampled	*Middle Kittanning*	1	7
Clay, rejected	*Middle Kittanning*		½
Coal, lower bench, sampled	*Middle Kittanning*	2	0
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.08	0.00
Volatile matter	39.75	41.88
Fixed carbon	45.40	47.83
Ash	9.77	10.29
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.74	69.25
Hydrogen	5.32	5.01
Oxygen	12.49	8.41
Nitrogen	1.14	1.20
Sulphur	5.54	5.84
Ash	9.77	10.29
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,802	7,166
	B. t. u.	12,244	12,899

Sample of Middle Kittanning coal taken by W. Stout and R. E. Lamborn in 1917 from mine of George Helriggle, east of Cannelville, central Section 27, Brush Creek Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale		10	0
Coal, bony, excluded	*Middle Kittanning*		7
Coal, good, sampled	*Middle Kittanning*	1	3
Shale, excluded	*Middle Kittanning*		1
Coal, good, sampled	*Middle Kittanning*		11
Smut with pyrite, excluded	*Middle Kittanning*		1
Coal, good, sampled	*Middle Kittanning*		10
Coal, bony, excluded	*Middle Kittanning*		1
Clay		2	0

Proximate analysis

	As received	Moisture free
Moisture	5.65	0.00
Volatile matter	44.36	47.01
Fixed carbon	42.85	45.42
Ash	7.14	7.57
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.35	72.44
Hydrogen	5.64	5.31
Oxygen	13.42	8.90
Nitrogen	1.02	1.08
Sulphur	4.43	4.70
Ash	7.14	7.57
	100.00	100.00

Air drying loss 2.1 per cent

		As received	Moisture free
Heating value	Calories	6,960	7,377
	B. t. u.	12,528	13,278

Fusion of ash: Incipient 2,028°F.; Complete 2,120°F.

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of S. T. Jones, Section 14, Newton Township, Muskingum County. Sample 18 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, bony, rejected	*Middle Kittanning*		8
Coal, upper bench, sampled		1	10
Clay, rejected			1
Coal, lower bench, sampled		1	7
Clay, impure, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.02	0.00
Volatile matter	38.16	40.18
Fixed carbon	47.26	49.76
Ash	9.56	10.06
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.88	69.36
Hydrogen	5.29	4.98
Oxygen	12.18	8.13
Nitrogen	1.12	1.18
Sulphur	5.97	6.29
Ash	9.56	10.06
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,758	7,115
	B. t. u.	12,164	12,807

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of New Crescent Mining Co., west central Section 4, Harrison Township, Perry County. Sample 18 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, soft.			
Coal, bony, rejected		1	0
Shale, rejected			2
Coal, upper bench, sampled	*Middle Kittanning*	1	7
Clay, rejected			½
Coal, lower bench, sampled		2	3
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	5.70	0.00
Volatile matter	38.83	41.18
Fixed carbon	47.02	49.86
Ash	8.45	8.96
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.77	71.87
Hydrogen	5.37	5.03
Oxygen	13.85	9.31
Nitrogen	1.18	1.25
Sulphur	3.38	3.58
Ash	8.45	8.96
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,851	7,265
	B. t. u.	12,332	13,077

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of Hamilton & Wallace Coal Co., north central Section 13, Harrison Township, Perry County. Sample 15 by 6 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, soft.			
Coal, bony, rejected		1	1
Shale, rejected			2
Coal, upper bench, sampled			6
Clay, rejected	*Middle Kittanning*		1
Coal, middle bench, sampled			8
Clay, rejected			1½
Coal, lower bench, sampled		1	10
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	6.40	0.00
Volatile matter	38.00	40.60
Fixed carbon	48.02	51.30
Ash	7.58	8.10
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.06	72.71
Hydrogen	5.49	5.11
Oxygen	14.89	9.83
Nitrogen	1.26	1.35
Sulphur	2.72	2.90
Ash	7.58	8.10
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,867	7,337
	B. t. u.	12,361	13,206

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from Keystone mine No. 1 of the Zanesville Coal Co., Sections 20 and 29, Harrison Township, Perry County. Sample 2 feet by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, tender.			
Coal, bony, rejected	*Middle Kittanning*		8
Shale, draw slate, rejected			2
Coal, upper bench, sampled		1	4
Clay, rejected			1
Coal, middle bench, sampled			7
Pyrite, rejected			1
Coal, lower bench, sampled		1	6
Clay, siliceous.			

Proximate analysis

	As received	Moisture free
Moisture	7.21	0.00
Volatile matter	37.60	40.52
Fixed carbon	49.93	53.81
Ash	5.26	5.67
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.77	75.19
Hydrogen	5.60	5.17
Oxygen	15.77	10.09
Nitrogen	1.26	1.36
Sulphur	2.34	2.52
Ash	5.26	5.67
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,008	7,553
	B. t. u.	12,614	13,595

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from Yost's mine, Section 18, Clayton Township, Perry County. Sample 21 by 7 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, tender		6	0
Shale, black		1	1
Coal, bony, rejected	*Middle Kittanning*		6
Coal, upper bench, sampled			8
Clay, sampled			¼
Coal, middle bench, sampled			6
Clay, rejected			3
Coal, lower bench, sampled		1	6
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	6.72	0.00
Volatile matter	38.30	41.07
Fixed carbon	48.34	51.82
Ash	6.64	7.11
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.45	73.38
Hydrogen	5.61	5.22
Oxygen	15.58	10.30
Nitrogen	1.29	1.39
Sulphur	2.43	2.60
Ash	6.64	7.11
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,903	7,400
	B. t. u.	12,425	13,320

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine No. 34 of the National Fuel Co., Section 3, Bearfield Township, Perry County. Sample 20 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled	Middle Kittanning		8
Pyrite, sampled			¼
Coal, middle bench, sampled			6
Clay shale, rejected			1
Coal, lower bench, sampled		2	6
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	5.90	0.00
Volatile matter	36.58	38.87
Fixed carbon	47.42	50.40
Ash	10.10	10.73
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.43	69.53
Hydrogen	5.26	4.90
Oxygen	13.03	8.28
Nitrogen	1.22	1.29
Sulphur	4.96	5.27
Ash	10.10	10.73
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,686	7,105
	B. t. u.	12,035	12,789

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of E. E. Tharp, north central Section 14, Pike Township, Perry County. Sample 10 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Coal, upper bench, sampled	*Middle Kittanning*	2	0
Pyrite, rejected			4
Coal, lower bench, sampled		2	8
Coal, shaly, rejected			2
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	5.25	0.00
Volatile matter	38.85	41.00
Fixed carbon	46.04	48.59
Ash	9.86	10.41
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.05	69.71
Hydrogen	5.38	5.07
Oxygen	14.10	9.95
Nitrogen	1.18	1.24
Sulphur	3.43	3.62
Ash	9.86	10.41
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,773	7,148
	B. t. u.	12,191	12,866

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of the Bristol Coal Co., Section 30, Pike Township, Perry County. Sample 10 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, bony, rejected	*Middle Kittanning*	1	0
Coal, upper bench, sampled		1	3
Clay, rejected			1½
Coal, lower bench, sampled		1	7
Clay, shaly.			

Proximate analysis

	As received	Moisture free
Moisture	7.00	0.00
Volatile matter	37.12	39.91
Fixed carbon	48.93	52.62
Ash	6.95	7.47
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.29	73.43
Hydrogen	5.58	5.16
Oxygen	15.59	10.08
Nitrogen	1.26	1.35
Sulphur	2.33	2.51
Ash	6.95	7.47
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,880	7,398
	B. t. u.	12,384	13,316

Sample of Middle Kittanning coal taken in 1905 by J. W. Groves from the Dixie mine of the Upson Coal and Mining Co., at Dixie, Section 31, Pike Township, Perry County.[1]

Sample taken 1,000 feet southwest of drift mouth.

		Ft.	In.
Shale, roof.			
Coal, bony, excluded	*Middle Kittanning*	1	0
Shale, excluded			5
Coal, sampled			2
Mother coal, sampled			¼
Coal, sampled		1	0
Shale, excluded			1½
Coal, sampled		1	10
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	8.87	0.00
Volatile matter	39.32	43.15
Fixed carbon	47.81	52.46
Ash	4.00	4.39
	100.00	100.00
Sulphur	1.74	1.92

Air drying loss 3.7 per cent

Sample taken in same mine, 1,000 feet southeast of drift mouth.

		Ft.	In.
Shale, roof.			
Coal, bony, excluded	*Middle Kittanning*		10½
Shale, excluded			3
Coal, sampled			7
Mother coal, sampled			¼
Coal, sampled			9
Shale, excluded			2
Coal, sampled		1	7
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	8.92	0.00
Volatile matter	38.58	42.36
Fixed carbon	46.65	51.22
Ash	5.85	6.42
	100.00	100.00

[1]United States Geological Survey, Bulletin 290, p. 160; Bureau of Mines, Bulletin 22, pp. 147, 671.

		As received	Moisture free
Sulphur		3.00	3.29
Air drying loss 3.8 per cent			
Heating value	Calories	6,849	7,520
	B. t. u.	12,328	13,536

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine No. 268 of the Sunday Creek Coal Co., Section 9, Monroe Township, Perry County. Sample 8 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, top layer, sampled	*Middle Kittanning*	3	0
Coal, upper bench, sampled		3	0
Coal, bony, rejected		2	5
Coal, lower bench, sampled		2	4
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	6.79	0.00
Volatile matter	35.45	38.04
Fixed carbon	51.85	55.62
Ash	5.91	6.34
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.30	75.42
Hydrogen	5.49	5.08
Oxygen	16.00	10.70
Nitrogen	1.30	1.39
Sulphur	1.00	1.07
Ash	5.91	6.34
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,983	7,492
	B. t. u.	12,569	13,485

Sample of Middle Kittanning coal taken in 1905 by J. W. Groves and W. J. Von Borries from Gosline and Barbour mine at Shawnee, central Section 15, Salt Lick Township, Perry County.[1] Sample taken 500 feet northeast of drift mouth.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Middle Kittanning*	1	8
Shale, excluded			4
Coal, sampled		1	2
Shale, excluded			1½
Coal, sampled		2	1
Clay, floor.			

[1]United States Geological Survey, Bulletin 290, p. 145; Bureau of Mines, Bulletin 22, pp. 147, 672.

Proximate analysis

	As received	Moisture free
Moisture	10.78	0.00
Volatile matter	34.86	39.07
Fixed carbon	48.23	54.06
Ash	6.13	6.87
	100.00	100.00
Sulphur	1.11	1.24
Heating value..... Calories	6,663	7,468
Heating value..... B. t. u.	11,993	13,442

Air drying loss 6.6 per cent

Sample taken in same mine, 300 feet northeast of drift mouth.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Middle Kittanning*		4
Shale, sampled			½
Coal, sampled		1	3
Shale, excluded			3
Coal, sampled		1	2
Shale, excluded			1
Coal, sampled		2	1
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	9.79	0.00
Volatile matter	35.74	39.62
Fixed carbon	48.46	53.72
Ash	6.01	6.66
	100.00	100.00
Sulphur	1.43	1.59

Air drying loss 5.2 per cent

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from Upson mine of the Upson Coal and Mining Co., Section 21, Salt Lick Township, Perry County. Sample 6 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, soft	*Middle Kittanning*		6–18
Coal, upper bench, sampled		4	3
Clay, shaly, rejected			2½
Coal, middle bench, sampled		1	6
Clay, rejected			1
Coal, lower bench, sampled		1	10
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	7.76	0.00
Volatile matter	33.50	36.32
Fixed carbon	51.27	55.58
Ash	7.47	8.10
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.30	74.04
Hydrogen	5.46	4.99
Oxygen	16.14	10.02
Nitrogen	1.18	1.28
Sulphur	1.45	1.57
Ash	7.47	8.10
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,772	7,342
	B. t. u.	12,190	13,216

Sample of Middle Kittanning coal taken by B. A. Eisenlohr in 1902 from mine of Continental Coal Co., south central Section 5, Ward Township, Hocking County. Sample 6½ by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled	*Middle Kittanning*	2	0
Shale, rejected			3
Coal, middle bench, sampled		3	0
Clay, rejected			5
Coal, middle bench, sampled		1	5
Clay, rejected			1
Coal, lower bench, sampled		2	1
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	7.55	0.00
Volatile matter	34.03	36.81
Fixed carbon	52.57	56.86
Ash	5.85	6.33
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.05	75.77
Hydrogen	5.52	5.06
Oxygen	16.39	10.47
Nitrogen	1.42	1.54
Sulphur	0.77	0.83
Ash	5.85	6.33
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,950	7,518
	B. t. u.	12,510	13,532

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from Green and Hite mine, on Sand Run, north central Section 21, Ward Township, Hocking County. Sample 8 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, sampled	*Middle Kittanning*	1	3
Coal, canneloid, shaly, rejected			4
Shale, rejected			4
Coal, bony, rejected			4
Coal, upper bench, sampled		1	10
Coal, soft, sampled			8
Clay, shaly, rejected			3
Coal, middle bench, sampled		2	0
Clay, shaly, rejected			1
Coal, lower bench, sampled		1	8
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	7.40	0.00
Volatile matter	34.17	36.90
Fixed carbon	53.43	57.70
Ash	5.00	5.40
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.58	76.22
Hydrogen	5.55	5.11
Oxygen	16.49	10.70
Nitrogen	1.32	1.43
Sulphur	1.06	1.14
Ash	5.00	5.40
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,027	7,589
	B. t. u.	12,649	13,660

Sample of Middle Kittanning coal taken by G. H. Dukes from No 2 mine of the Sunday Creek Coal Co., at Jobs, north central Section 2, Ward Township, Hocking County.[1]

		Ft.	In.
Coal, bony, excluded		0	6
Coal, top, sampled		1	2
Coal, gray, soft and sulphurous, excluded			8
Shale, excluded	*Middle Kittanning*		4
Coal, middle bench, sampled		1	6
Shale, excluded			1
Coal, bottom bench, sampled		1	6
Clay, floor.			

[1]United States Bureau of Mines, Bulletin 22, pp. 146, 667.

Proximate analysis

	As received	Moisture free
Moisture	9.72	0.00
Volatile matter	32.44	35.93
Fixed carbon	53.41	59.16
Ash	4.43	4.91
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.50	76.99
Hydrogen	5.70	5.12
Oxygen	18.58	11.00
Nitrogen	1.25	1.38
Sulphur	0.54	0.60
Ash	4.43	4.91
	100.00	100.00

Air drying loss 5.5 per cent

		As received	Moisture free
Heating value	Calories	6,804	7,537
	B. t. u.	12,247	13,567

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from Cawthorne mine of the New Pittsburgh Coal Co., west central Section 7, Ward Township, Hocking County. Sample 12 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, splint		1	6
Shale, black		1	2
Coal, upper bench, sampled	*Middle Kittanning*	1	3
Coal, soft, rejected			10
Shale, rejected			4
Coal, middle bench, sampled		1	6
Shale, rejected			1
Coal, lower bench, sampled		1	6
Clay, shaly.			

Proximate analysis

	As received	Moisture free
Moisture	7.45	0.00
Volatile matter	35.01	37.83
Fixed carbon	52.73	56.97
Ash	4.81	5.20
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.04	76.76
Hydrogen	5.53	5.08
Oxygen	16.53	10.71
Nitrogen	1.43	1.54
Sulphur	0.66	0.71
Ash	4.81	5.20
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,057	7,625
	B. t. u.	12,703	13,725

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of Haydenville Coal Co., Section 1, Green Township, Hocking County. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale, draw slate			4
Coal, upper bench, sampled	*Middle Kittanning*	1	3
Clay, shaly, rejected			3
Coal, middle bench, sampled		2	2½
Clay, shaly, rejected			4
Coal, lower bench, sampled		1	1
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	6.55	0.00
Volatile matter	37.30	39.91
Fixed carbon	49.18	52.63
Ash	6.97	7.46
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.40	73.19
Hydrogen	5.45	5.05
Oxygen	15.43	10.29
Nitrogen	1.18	1.26
Sulphur	2.57	2.75
Ash	6.97	7.46
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,901	7,385
	B. t. u.	12,422	13,293

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of J. W. Washburn, Section 22, Starr Township, Hocking County. Sample 14 by 4½ inches. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale, draw slate			6½
Coal, upper bench, sampled	*Middle Kittanning*	2	6
Clay, shaly, rejected			1
Coal, lower bench, sampled			5
Clay, siliceous.			

Proximate analysis

	As received	Moisture free
Moisture	6.52	0.00
Volatile matter	38.30	40.97
Fixed carbon	47.15	50.44
Ash	8.03	8.59
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.33	72.03
Hydrogen	5.49	5.10
Oxygen	14.43	9.23
Nitrogen	1.20	1.28
Sulphur	3.52	3.77
Ash	8.03	8.59
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,850	7,328
	B. t. u.	12,330	13,190

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from Mine No. 254 of the Continental Coal Co., southwest quarter of Section 7, Trimble Township, Athens County. Sample 8 by 7 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, rooster, rejected	*Middle Kittanning*	3	0
Coal, cannel, rejected		1	6
Coal, bony, rejected		1	3
Coal, upper bench, sampled		2	0
Clay, rejected			3
Coal, middle bench, sampled		1	0
Clay, rejected			1
Coal, lower bench, sampled		2	6
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	7.28	0.00
Volatile matter	32.38	34.92
Fixed carbon	53.61	57.82
Ash	6.73	7.26
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.46	74.91
Hydrogen	5.45	5.00
Oxygen	16.16	10.45
Nitrogen	1.34	1.45
Sulphur	0.86	0.93
Ash	6.73	7.26
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,894	7,435
	B. t. u.	12,409	13,383

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of Continental Coal Co., northwest Section 20, Dover Township, Athens County. Sample 14 by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, tender.			
Coal, sampled	*Middle Kittanning*	1	6
Shale, excluded			4
Coal, bony, excluded			8
Coal, upper bench, sampled		1	6
Coal, soft, sampled			5
Shale, rejected			3
Coal, middle bench, sampled		1	6
Shale, rejected			1
Coal, lowet bench, sampled		1	8
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	7.14	0.00
Volatile matter	34.22	36.85
Fixed carbon	51.92	55.91
Ash	6.72	7.24
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.32	74.65
Hydrogen	5.56	5.14
Oxygen	15.45	9.80
Nitrogen	1.30	1.39
Sulphur	1.65	1.78
Ash	6.72	7.24
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,863	7,390
	B. t. u.	12,353	13,302

Sample of Middle Kittanning coal taken in 1907 by D. D. Condit from mine of Canaanville Coal Co., northwest Section 9, Canaan Township, Athens County. Sample 5 by 3 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, unmeasured.			
Coal, sampled			10
Shale, rejected			3
Coal, upper bench, sampled		1	7
Shale, rejected	*Middle Kittanning*		2¾
Coal, middle bench, sampled			6½
Coal, bony, sampled			1½
Coal, lower bench, sampled		2	4
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	6.36	0.00
Volatile matter	34.19	36.51
Fixed carbon	50.96	54.42
Ash	8.49	9.07
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.25	73.95
Hydrogen	5.40	5.01
Oxygen	14.92	9.90
Nitrogen	1.43	1.53
Sulphur	0.51	0.54
Ash	8.49	9.07
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,919	7,389
	B. t. u.	12,454	13,300

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of Luhrig Coal Co., at Luhrig, west central Athens Township, Athens County. Sample 3½ by 5 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled		2	5
Shale, rejected			4
Coal, upper bench, sampled		1	9
Clay, shaly, rejected	*Middle Kittanning*		2½
Coal, middle bench, sampled		1	9
Clay, shaly, rejected			1
Coal, lower bench, sampled			9
Clay, not measured.			

Proximate analysis

	As received	Moisture free
Moisture	6.17	0.00
Volatile matter	36.40	38.80
Fixed carbon	49.61	52.87
Ash	7.82	8.33
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.22	73.77
Hydrogen	5.43	5.05
Oxygen	15.33	10.50
Nitrogen	1.30	1.39
Sulphur	0.90	0.96
Ash	7.82	8.33
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,868	7,319
	B. t. u.	12,362	13,174

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of J. P. Hardy, on land of Mrs. T. H. McAdoo, northwest quarter of Section 27, Waterloo Township, Athens County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, upper bench, sampled		2	0
Shale, rejected	*Middle Kittanning*		1
Coal, lower bench, sampled			8
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	6.80	0.00
Volatile matter	36.90	39.59
Fixed carbon	48.25	51.77
Ash	8.05	8.64
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.40	72.32
Hydrogen	5.49	5.07
Oxygen	15.55	10.20
Nitrogen	1.37	1.47
Sulphur	2.14	2.30
Ash	8.05	8.64
	100.00	109.00

		As received	Moisture free
Heating value	Calories	6,794	7,290
	B. t. u.	12,229	13,122

Sample of Middle Kittanning coal taken in 1902 by B. A. Eisenlohr from mine of Carbondale Coal Co., northeast quarter of Section 36, Waterloo Township, Athens County. Sample 16 by 4½ inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, rooster, rejected		1	0
Shale, hard, rejected			6
Coal, bony, rejected		1	6
Coal, upper bench, sampled	*Middle Kittanning*		10
Clay, shaly, rejected			4
Coal, middle bench, sampled		2	4
Clay, shaly, rejected			1
Coal, lower bench, sampled			6
Clay, not measured.			

Proximate analysis

	As received	Moisture free
Moisture	6.70	0.00
Volatile matter	35.36	37.90
Fixed carbon	51.19	54.87
Ash	6.75	7.23
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.21	74.18
Hydrogen	5.49	5.09
Oxygen	15.09	9.80
Nitrogen	1.18	1.26
Sulphur	2.28	2.44
Ash	6.75	7.23
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,921	7,418
	B. t. u.	12,458	13,352

Sample of Middle Kittanning coal taken in 1925 by P. R. Maxey and T. R. Meyers from mine of A. E. Kennard, near Moonville, northwest Section 7, Brown Township, Vinton County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, massive, roof		20	0
Coal, rough, sampled			4½
Clay and bony coal, rejected			4½
Coal, good, sampled	*Middle Kittanning*	1	11½
Clay, shaly, rejected			1½
Coal, good, sampled			4¾
Clay, siliceous, floor		2	0

Proximate analysis

	As received	Moisture free
Moisture	8.58	0.00
Volatile matter	40.53	44.33
Fixed carbon	40.36	44.15
Ash	10.53	11.52
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	62.97	68.88
Hydrogen	5.55	5.03
Oxygen	15.55	8.67
Nitrogen	1.33	1.45
Sulphur	4.07	4.45
Ash	10.53	11.52
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,322	6,915
	B. t. u.	11,379	12,447

Fusion of ash	Incipient	2,406°F.
	Complete	2,509°F.

Sample of Middle Kittanning coal taken in 1925 by Miles Ogan, W. Stout, T. R. Meyers, and P. R. Maxey from mine of Ohio Mineral Co., at Horse Cave, one mile west of Hope Furnace, central Section 21, Brown Township, Vinton County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, massive		30	0
Coal, bony, rejected	*Middle Kittanning*	2	8
Clay and bone shale, rejected			4½
Coal, good, sampled			3¼
Clay, impure, rejected			2
Coal, good, sampled			4¾
Clay, siliceous		1	0

Proximate analysis

	As received	Moisture free
Moisture	7.83	0.00
Volatile matter	41.71	45.25
Fixed carbon	44.73	48.53
Ash	5.73	6.22
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.68	74.51
Hydrogen	5.74	5.28
Oxygen	15.66	9.44
Nitrogen	1.53	1.66
Sulphur	2.66	2.89
Ash	5.73	6.22
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,779	7,355
	B. t. u.	12,202	13,239

Fusion of ash	Incipient	2,388°F.
	Complete	2,478°F.

Sample of Middle Kittanning coal taken in 1925 by Miles Ogan, W. Stout, P. R. Maxey, and T. R. Meyers from mine of G. P. Drayer, West Fork Wildcat Hollow, northeast corner of Section 27, Brown Township, Vinton County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, massive		30	0
Shale, gray			8½
Coal, somewhat rough, sampled	*Middle Kittanning*		7½
Clay and bone coal, rejected			4½
Coal, good, sampled		1	½
Mother coal, with pyrite, sampled			1
Coal, good, sampled		1	5
Clay shale, rejected			1
Coal, good, sampled			5
Clay, siliceous		1	0

Proximate analysis

	As received	Moisture free
Moisture	9.89	0.00
Volatile matter	38.14	42.32
Fixed carbon	43.58	48.36
Ash	8.39	9.32
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.56	71.65
Hydrogen	5.59	4.98
Oxygen	16.74	8.81
Nitrogen	1.47	1.63
Sulphur	3.25	3.61
Ash	8.39	9.32
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,387	7,088
	B. t. u.	11,496	12,758

Fusion of ash	Incipient	2,406°F.
	Complete	2,478°F.

Sample of Middle Kittanning coal taken in 1925 by P. R. Maxey and T. R. Meyers from mine of J. V. Hull, central Section 11, Brown Township, Vinton County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, massive		36	0
Coal, upper bench, sampled	*Middle Kittanning*, altitude 804 feet		7½
Clay and bone, rejected			2¼
Coal, hard, sampled		2	4
Clay, rejected			1½
Coal, sampled			6

Proximate analysis

	As received	Moisture free
Moisture	8.32	0.00
Volatile matter	39.46	43.04
Fixed carbon	43.52	47.47
Ash	8.70	9.49
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.42	71.36
Hydrogen	5.53	5.03
Oxygen	15.59	8.93
Nitrogen	1.38	1.50
Sulphur	3.38	3.69
Ash	8.70	9.49
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,502	7,092
	B. t. u.	11,704	12,766

Fusion of ash: Incipient 2,406°F.; Complete 2,509°F.

Sample of Middle Kittanning coal taken in 1906 by D. D. Condit from mine of Black Diamond Coal Co., northeast corner of Section 9, Greenfield Township, Gallia County. Sample 6 by 4 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, gray		2	0
Coal, upper bench, sampled	*Middle Kittanning*	1	9½
Clay, rejected			5½
Coal, middle bench, sampled			10½
Shale, rejected			1
Coal, lower bench, rejected			2
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	8.08	0.00
Volatile matter	37.53	40.83
Fixed carbon	45.87	49.90
Ash	8.52	9.27
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.71	71.49
Hydrogen	5.48	4.98
Oxygen	15.47	9.02
Nitrogen	1.18	1.28
Sulphur	3.64	3.96
Ash	8.52	9.27
	100.00	100.00

Moisture in air dried sample from 2½ to 3 per cent

		As received	Moisture free
Heating value	Calories	6,717	7,307
	B. t. u.	12,091	13,153

Sample of Middle Kittanning coal taken in 1907 by D. D. Condit from mine of G. L. Chatfield, one mile northeast of Sheridan, east central Section 18, Perry Township, Lawrence County. Sample 5 by 3 inches. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, unmeasured.			
Coal, shaly, sampled	*Middle Kittanning*		6
Shale, persistent, rejected			½
Coal, sampled		2	6
Shale, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	6.64	0.00
Volatile matter	34.28	36.72
Fixed carbon	48.16	51.58
Ash	10.92	11.70
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.95	69.57
Hydrogen	5.16	4.73
Oxygen	14.42	9.13
Nitrogen	1.23	1.32
Sulphur	3.32	3.55
Ash	10.92	11.70
	100.00	100.00

Moisture in air dried sample from 2½ to 3 per cent

		As received	Moisture free
Heating value	Calories	6,626	7,097
	B. t. u.	11,927	12,775

UPPER KITTANNING COAL

Although this coal bed is important in Pennsylvania, it thins westward and is of no value in Ohio. In fact it is rarely found and the name seldom appears in publications of this State. Probably the coal is at its best in Columbiana County, which joins Pennsylvania, but even there, according to Stout, it is rarely present and its maximum thickness is only 1 foot. Its position is given as from 12 to 23 feet above the Middle Kittanning coal.[1]

LOWER FREEPORT OR No. 6a COAL

The Lower Freeport coal is of small value in Ohio, the chief known deposit and mining center being in the vicinity of Steubenville, Jefferson County. The coal is there reached by shafting, the first shaft having been sunk in 1855 and the coal found at a depth of about 187 feet. Although the bed attains in places a thickness of 5 feet its usual measurement is about 4 feet. The coal yields a fair grade of coke and

[1]Geological Survey Ohio, Bulletin 28, p. 182.

it was formerly used for this purpose at Steubenville. At present the market for the coal is for steam production and general heating.

The limits of the Steubenville field of the Lower Freeport coal are at present unknown. It has been found at Rush Run in the Ohio Valley 10 miles south of the court house where the coal measures 7 feet, but only 5 feet of this is of good quality. Moreover the coal is unsteady in thickness and in places is absent. West of Steubenville the bed is under heavy cover and definite information concerning it is lacking. The coal probably extends north and northwest to Yellow Creek and in that event underlies a larger area.

The Lower Freeport coal is mined for railroad shipment in the vicinity of Amsterdam and Bergholz, Jefferson County. At Amsterdam the coal is reached by shafting.

Aside from Jefferson County, the Lower Freeport coal of Ohio has small value. The bed is widely distributed in Columbiana County but its maximum thickness there, as recorded by Stout, is only 3 feet and the average about one-half that. Moreover its composition is unsteady and it does not appear that it can be of more than local value.

The Lower Freeport coal can be readily followed southwest from the area just outlined, but the bed is thin and inconstant. It measures 3 feet at a place or two and as much as 5 feet at one place in Perry County. Stout assigns only one foot for the greatest thickness of the bed in Vinton County. The coal is a little thicker in Lawrence County but rarely thick enough for drift mining. It is there known as the Hatcher bed. The position of the coal with reference to higher and lower beds is shown in preceding and following sections so that none are necessary here. (Pages 73, 170.)

Sections and analyses

Sample of Lower Freeport coal taken in 1916 by J. H. Hance from Kinsey mine, south central Section 28, St. Clair Township, Columbiana County.[1]

		Ft.	In.
Shale, sandy, roof of mine, not measured.			
Shale, bony and black, excluded			2½
Coal, sampled	*Lower Freeport*		3
Clay parting, sampled			⅛
Coal, sampled			4½
Clay parting, sampled			⅛
Coal, sampled			3½
Clay parting, sampled			⅛
Coal, sampled			2⅝

[1]United States Bureau of Mines, Bull. 193, pp. 49, 201.

		Ft.	In.
Clay parting, excluded			½
Coal, bony, excluded			2½
Clay, pyritiferous, excluded			2
Coal, sampled	*Lower Freeport*		7½
Pyrite and clay, excluded			1¼
Coal, sampled			7½
Clay, excluded			1½
Coal, sampled			3½

Proximate analysis

	As received	Moisture free
Moisture	3.58	0.00
Volatile matter	38.47	39.90
Fixed carbon	47.48	49.24
Ash	10.47	10.86
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.04	72.64
Hydrogen	5.39	5.18
Oxygen	8.05	5.04
Nitrogen	1.56	1.62
Sulphur	4.49	4.66
Ash	10.47	10.86
	100.00	100.00

Air drying loss 1.8 per cent

		As received	Moisture free
Heating value	Calories	7,138	7,403
	B. t. u.	12,848	13,325

Sample of Lower Freeport coal taken in 1917 by J. H. Hance from Sheckler mine, Section 5, Yellow Creek Township, Columbiana County.[1]

		Ft.	In.
Shale roof, not measured.			
Clay shale, bituminous, excluded			3½
Coal, dirty, sampled			1¼
Coal, sampled			4¼
Clay, black, sampled			¼
Coal, sampled	*Lower Freeport*		6
Shale, bony, excluded			1
Coal, sampled			10

Proximate analysis

	As received	Moisture free
Moisture	5.94	0.00
Volatile matter	32.73	34.80
Fixed carbon	49.81	52.95
Ash	11.52	12.25
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.30	72.62
Hydrogen	5.28	4.91
Oxygen	12.06	7.20
Nitrogen	1.35	1.44
Sulphur	1.49	1.58
Ash	11.52	12.25
	100.00	100.00

Air drying loss 3.6 per cent

[1]United States Bureau of Mines, Bull. 193, pp. 50, 205.

		As received	Moisture free
Heating value	Calories	6,726	7,151
	B. t. u.	12,107	12,872

Sample of Lower Freeport coal taken in 1916 by J. H. Hance from the Banfield mine of the Banfield Clay Co., Irondale, northwest corner of Section 25, Saline Township, Jefferson County.[1]

		Ft.	In.
Shale, roof.			
Clay, shaly, excluded			1¾
Coal, bony and pyritiferous, excluded	*Lower Freeport*		3
Pyrite, sandy band, excluded			2⅛
Coal, sampled		1	1¾
Clay, with pyrite, excluded			1
Coal, sampled		1	2
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.26	0.00
Volatile matter	35.55	37.13
Fixed carbon	48.10	50.24
Ash	12.09	12.63
	100.00	100.00
Sulphur	2.36	2.46

Air drying loss 2.5 per cent

Heating value	Calories	6,941	7,250
	B. t. u.	12,494	13,050

Sample of Lower Freeport coal taken in 1926 by T. R. Meyers and G. W. White from the Hilsinger mine of the Locust Grove Coal Co., north central Section 30, Island Creek Township, Jefferson County. Analysis by D. J. Demorest.

		Ft.	In.
Sbale top.			
Coal, good, sampled		1	10
Clay shale, gray, soft, rejected			3
Coal, bony, rejected	*Lower Freeport*		1
Clay shale, rejected			2
Coal, bony, rejected			3
Coal, good, block, sampled			9
Clay shale, bottom.			

[1]United States Bureau of Mines, Bull. 193, pp. 51, 208.

Proximate analysis

	As received	Moisture free
Moisture	3.10	0.00
Volatile matter	38.06	39.28
Fixed carbon	48.91	50.47
Ash	9.93	10.25
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.53	72.79
Hydrogen	5.14	4.96
Oxygen	9.70	7.15
Nitrogen	1.10	1.14
Sulphur	3.60	3.71
Ash	9.93	10.25
	100.00	100.00

Air drying loss 1.78 per cent

		As received	Moisture free
Heating value	Calories	7,222	7,453
	B. t. u.	12,999	13,415

Fusion of ash	Incipient	2,390°F.
	Complete	2,480°F.

Sample of Lower Freeport coal taken in 1926 by T. R. Meyers and G. W. White from Follansbee Forge mine of Follansbee Brothers, on river front, north central Section 29, Island Creek Township, Jefferson County. Analysis by D. J. Demorest.

		Ft.	In.
Shale.			
Coal, good, sampled	*Lower Freeport*	1	10
Shale, gray, hard, rejected			1½
Coal, bony, rejected			1¾
Shale, dark, hard, rejected			¼
Coal, good, sampled		1	2
Clay shale, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	0.00	0.00
Volatile matter	40.89	40.89
Fixed carbon	48.41	48.41
Ash	10.70	10.70
	100.00	100.00
Sulphur	3.47	3.47

Air drying loss 0.00 per cent

Heating value	Calories	7,184	7,184
	B. t. u.	12,931	12,931

Fusion of ash	Incipient	2,372°F.
	Complete	2,480°F.

Sample of Lower Freeport coal taken in 1926 by T. R. Meyers and G. W. White from High Shaft mine of the Steubenville Coal Mining Co., southwest Section 30, Steubenville Township, Jefferson County. Analysis by D. J. Demorest.

		Ft.	In.
Coal, good, taken		3	6
Mother coal with sulphur, rejected			1
Coal, rejected	*Lower Freeport*		1
Shale, dark, hard, rejected			1
Coal, good, sampled			9
Clay, shaly, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	0.00	0.00
Volatile matter	40.91	40.91
Fixed carbon	53.66	53.66
Ash	5.43	5.43
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	76.95	76.95
Hydrogen	5.17	5.17
Oxygen	9.47	9.47
Nitrogen	1.40	1.40
Sulphur	1.58	1.58
Ash	5.43	5.43
	100.00	100.00

Air drying loss 0.00 per cent

		As received	Moisture free
Heating value	Calories	7,633	7,633
	B. t. u.	13,740	13,740

Fusion of ash: Incipient 2,480°F.; Complete, 2,566°F.

Sample of Lower Freeport coal taken in 1913 by D. D. Condit from La Belle mine of the La Belle Iron and Steel Co., southwest quarter of Section 29, Steubenville Township, Jefferson County.[1]

Sample measured 5,200 feet southeast of shaft.

		Ft.	In.
Shale, roof.			
Coal, sampled		1	9
Coal, bony, sampled			¼
Coal, sampled	*Lower Freeport*		9
Shale, excluded			1¼
Coal, sampled			6½
Clay, shaly, floor.			

[1]Sample taken by United States Geological Survey, analysis by United States Bureau of Mines, Bull. 85, pp. 63, 250.

Proximate analysis

	As received	Moisture free
Moisture	3.82	0.00
Volatile matter	35.90	37.33
Fixed carbon	53.43	55.55
Ash	6.85	7.12
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	74.20	77.15
Hydrogen	5.24	5.01
Oxygen	10.36	7.23
Nitrogen	1.45	1.51
Sulphur	1.90	1.98
Ash	6.85	7.12
	100.00	100.00

Air drying loss 1.6 per cent

		As received	Moisture free
Heating value	Calories	7,418	7,712
	B. t. u.	13,352	13,882

Sample measured in same mine 4,400 feet southeast of shaft.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled	*Lower Freeport*	1	9
Coal, bony, rejected			1
Coal, sampled			8½
Shale, excluded			3
Coal, sampled			7
Clay, shaly, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.80	0.00
Volatile matter	35.39	36.79
Fixed carbon	53.39	55.50
Ash	7.42	7.71
	100.00	100.00
Sulphur	1.91	1.99

Air drying loss 1.5 per cent

Heating value	Calories	7,344	7,634
	B. t. u.	13,219	13,741

Sample of Lower Freeport coal taken in 1912 by D. D. Condit from the Eastern Ohio mine of the Rice Coal Co., near Amsterdam, northeast quarter of Section 8, Springfield Township, Jefferson County.[2]

[1]Idem.

[2]Sample taken by United States Geological Survey, analysis by United States Bureau of Mines, Bull. 85, pp. 61, 247.

Sample measured in room 11 off west butt entry 12.

		Ft.	In.
Shale, roof.			
Coal, impure, excluded			4
Coal, sampled		2	5
Coal, bony, excluded	*Lower Freeport*		2
Coal, sampled		2	3
Coal, impure, excluded			2
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.58	0.00
Volatile matter	37.58	38.97
Fixed carbon	49.17	51.00
Ash	9.67	10.03
	100.00	100.00
Sulphur	3.08	3.19
Air drying loss 1.5 per cent		
Heating value, Calories	7,156	7,421
Heating value, B. t. u.	12,881	13,358

Sample measured in same mine at west entry 13, off south face entry.[1]

		Ft.	In.
Shale, roof.			
Coal, impure, excluded			4
Coal, sampled		2	9
Coal, bony, excluded	*Lower Freeport*		3
Coal, sampled		2	0
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.47	0.00
Volatile matter	38.61	40.00
Fixed carbon	49.66	51.44
Ash	8.26	8.56
	100.00	100.00
Sulphur	2.40	2.49
Air drying loss 1.5 per cent		
Heating value, Calories	7,346	7,610
Heating value, B. t. u.	13,223	13,698

[1]Idem.

Sample measured in same mine in left butt entry 12, off the north face entry.[1]

		Ft.	In
Shale, roof.			
Coal, impure, excluded	*Lower Freeport*		3
Coal, sampled		3	1
Coal, bony, excluded			2½
Coal, sampled		1	10
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.04	0.00
Volatile matter	38.61	40.24
Fixed carbon	48.93	50.99
Ash	8.42	8.77
	100.00	100.00
Sulphur	2.95	3.07
Air drying loss 2.00 per cent		
Heating value, Calories	7,234	7,539
Heating value, B. t. u.	13,021	13,570

Sample of Lower Freeport coal taken in 1910 by J. W. Paul from Amsterdam mine of the Youghiogheny and Ohio Coal Co., near Amsterdam, Section 18, Springfield Township, Jefferson County.[2]

		Ft.	In
Coal, bony, excluded	*Lower Freeport*	1	1
Coal, clean, sampled		4	1

Proximate analysis

	As received	Moisture free
Moisture	3.36	0.00
Volatile matter	37.56	38.87
Fixed carbon	52.06	53.87
Ash	7.02	7.26
	100.00	100.00
Sulphur	2.40	2.48
Air drying loss 1.4 per cent		

[1]Idem.

[2]Section and analysis by United States Bureau of Mines, Bull. 85, pp. 61, 246.

Sample of Lower Freeport coal taken in 1912 by D. D. Condit from Amsterdam mine of the Youghiogheny and Ohio Coal Co.,[1] near Amsterdam, northwest Section 18, Springfield Township, Jefferson County. Sample measured in room 4, off entry 4.

		Ft.	In.
Shale, or bony coal, roof.			
Coal, bony, excluded	*Lower Freeport*	1	3
Coal, sampled		1	11
Coal, bony, excluded			2½
Coal, sampled		1	10
Coal, impure, excluded			5
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.66	0.00
Volatile matter	37.43	38.85
Fixed carbon	51.23	53.18
Ash	7.68	7.97
	100.00	100.00
Sulphur	3.07	3.19
Air drying loss 1.6 per cent		
Heating value, Calories	7,342	7,621
Heating value, B. t. u.	13,216	13,718

Sample measured in same mine in room 15, off west entry 9, Section 2, north.[2]

		Ft.	In.
Shale or bony coal, roof.			
Coal, bony, excluded	*Lower Freeport*	1	2
Coal, sampled		1	7½
Coal, bony, excluded			3½
Coal, sampled		1	8½
Coal, impure, excluded			5
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.52	0.00
Volatile matter	38.31	39.71
Fixed carbon	50.78	52.63
Ash	7.39	7.66
	100.00	100.00
Sulphur	2.99	3.10
Air drying loss 1.4 per cent		
Heating value, Calories	7,363	7,632
Heating value, B. t. u.	13,253	13,738

[1]Sample taken by United States Geological Survey, analysis by United States Bureau of Mines, Bull. 85, pp. 61, 246.

[2]Idem.

Sample measured in same mine in Section 3 south, west entry 8.

		Ft.	In.
Shale or bony coal, roof.			
Coal, bony, excluded	*Lower Freeport*	1	2
Coal, sampled		1	6½
Coal, bony, excluded			3
Coal, sampled		1	11
Coal, impure, excluded			5
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.27	0.00
Volatile matter	38.87	40.18
Fixed carbon	50.37	52.08
Ash	7.49	7.74
	100.00	100.00
Sulphur	3.23	3.34
Air drying loss 1.2 per cent		
Heating value—Calories	7,359	7,608
Heating value—B. t. u.	13,246	13,694

Sample of Lower Freeport coal taken in 1912 by D. D. Condit from the Elizabeth mine of the Wolf Run Coal Co., two miles east of Amsterdam, southeast quarter of Section 7, Springfield Township, Jefferson County.[2]

Sample taken 2,600 feet northwest of shaft.

		Ft.	In.
Shale, roof.			
Coal, impure	*Lower Freeport*		5
Coal, bony, excluded			2
Coal, sampled		1	9
Coal, bony, excluded			3½
Coal, sampled		1	7
Coal, impure, excluded			3
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.40	0.00
Volatile matter	38.01	39.35
Fixed carbon	52.37	54.21
Ash	6.22	6.44
	100.00	100.00

[1]Idem.

[2]Sample taken by United States Geological Survey, analysis by United States Bureau of Mines, Bull. 85, pp. 61, 247.

	As received	Moisture free
Sulphur	2.20	2.28

Air drying loss 1.7 per cent

Heating value	Calories	7,518	7,783
	B. t. u.	13,532	14,009

Sample from same mine, 2,400 feet west of shaft.[1]

		Ft.	In.
Shale, roof.			
Coal, bony, excluded	*Lower Freeport*		7
Coal, impure			7
Coal, bony, excluded			2½
Coal, sampled		1	9
Coal, bony, excluded			3
Coal, sampled		1	9
Coal, impure, excluded			4
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.50	0.00
Volatile matter	37.93	39.31
Fixed carbon	50.63	52.46
Ash	7.94	8.23
	100.00	100.00
Sulphur	3.14	3.25

Air drying loss 1.4 per cent

Heating value	Calories	7,364	7,631
	B. t. u.	13,255	13,736

Sample from same mine, 2,600 feet northeast of shaft.[1]

		Ft.	In.
Shale, roof.			
Coal, bony, excluded	*Lower Freeport*		4½
Coal, impure			6
Coal, bony, excluded			1
Coal, sampled		1	7
Coal, bony, excluded			3½
Coal, sampled		1	9½
Clay, floor.			

[1]Idem.

Proximate analysis

	As received	Moisture free
Moisture	3.59	0.00
Volatile matter	37.03	38.41
Fixed carbon	50.64	52.52
Ash	8.74	9.07
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.30	73.95
Hydrogen	5.19	4.97
Oxygen	9.68	6.73
Nitrogen	1.39	1.44
Sulphur	3.70	3.84
Ash	8.74	9.07
	100.00	100.00

Air drying loss 1.8 per cent

		As received	Moisture free
Heating value	Calories	7,224	7,493
	B. t. u.	13,003	13,487

Sample of Lower Freeport coal taken in 1926 by G. W. White and T. R. Meyers from mine of Amsterdam Coal Co., west central Section 13, Springfield Township, Jefferson County. Analysis by D. J. Demorest.

		Ft.	In.
Coal, bony, rejected	*Lower Freeport*		3
Shale, dark, coaly bands, rejected		1	5
Coal, good, sampled		3	2
Coal, bony, full of sulphur, rejected			2

Proximate analysis

	As received	Moisture free
Moisture	3.83	0.00
Volatile matter	41.00	42.64
Fixed carbon	47.68	49.57
Ash	7.49	7.79
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.76	74.62
Hydrogen	5.50	5.28
Oxygen	11.22	8.11
Nitrogen	1.17	1.22
Sulphur	2.86	2.98
Ash	7.49	7.79
	100.00	100.00

Air drying loss 1.9 per cent

		As received	Moisture free
Heating value	Calories	7,269	7,558
	B. t. u.	13,084	13,604
Fusion of ash	Incipient	2,358°F.	
	Complete	2,415°F.	

Sample of Lower Freeport coal taken in 1917 by W. Stout and R. E. Lamborn from Harvey Snoots mine, three-fourths mile southeast of Salem School, south central Madison Township, Muskingum County. Analysis by D. J. Demorest.

		Ft	In.
Sandstone, shaly		5	0
Shale, siliceous		3	0
Coal, bony, rejected	*Lower Freeport*		3
Coal, good, sampled	*Lower Freeport*	3	0
Sandstone, shaly		3	0

Proximate analysis	As received	Moisture free
Moisture	5.35	0.00
Volatile matter	44.46	46.97
Fixed carbon	43.33	45.78
Ash	6.86	7.25
	100.00	100.00

Ultimate analysis	As received	Moisture free
Carbon	70.03	73.99
Hydrogen	5.85	5.56
Oxygen	13.77	9.53
Nitrogen	1.40	1.47
Sulphur	2.09	2.20
Ash	6.86	7.25
	100.00	100.00

Air drying loss 1.9 per cent

		As received	Moisture free
Heating value	Calories	7,099	7,500
	B. t. u.	12,778	13,500

Fusion of ash	Incipient	2,107°F.
	Complete	2,174°F.

UPPER FREEPORT OR No. 7 COAL

The Upper Freeport is the third coal bed in importance in Ohio. Its position with reference to other beds of the Allegheny series and of the Conemaugh series is shown in sections in preceding and following pages (73, 170). It forms the topmost member of the Allegheny series, and this gives it stratigraphical importance. Like other important coal beds, the Upper Freeport can be followed from the Ohio-Pennsylvania State line southwest to the Ohio River, which it reaches in Lawrence County, and from there into Kentucky.

If the Middle Kittanning be taken as the persistent or continuous coal bed of Ohio, the Upper Freeport may be selected as the patchy or discontinuous representative. The Mahoning sandstone in places forms the roof, and in some of these it occupies the place of the coal in whole or in part. In quality the coal is good, its main uses being for general heating and steam generation. As the coal is tender, it does not bear transportation well, in that respect being similar to the Pocahontas coals of West Virginia.

There are two main fields of Upper Freeport coal in Ohio and several of lesser importance. Columbiana County is one of major interest and in the vicinity of Salineville the bed has long been worked in a large way. Within the past 20 years the industry has expanded geographically, and as the demand increases the output of coal will

keep pace with the market call. Stout places the maximum thickness of the bed in this county at 8 feet and gives 3 feet 3 inches as the average of more than 80 records. The area, he states, is about 313 square miles but of this not more than 170 is workable.[1]

The most important deposit of Upper Freeport coal in Ohio is the Cambridge field which in a general way extends from Cambridge, Guernsey County, on the north, to Caldwell, Noble County, on the south. This field with three subordinate ones is well shown on Map 4. The coal has been mined for railroad shipment during 50 years and much of the best coal has been removed. In thickness the bed in most places where worked varies from 3 to 5 feet. The structure is similar to that of Columbiana County, i. e., two benches with one parting, and this in most places near the bottom.

Much smaller deposits of Upper Freeport coal are known in many places and among these are Carroll and Tuscarawas counties; the Sunday Creek Valley of Perry and Athens counties; the west side of Athens County, near Buchtel and Nelsonville. Farther south the best known deposit is in the eastern part of Lawrence County where it is known as the Waterloo field. There its thickness may attain 6 feet but it is very unsteady and its one parting may expand to a foot or more.

Sections and analyses

Sample of Upper Freeport coal taken in 1921 by C. F. Moses from mine of Jones Coal Co., near Negley, southwest Section 11, Middleton Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray		3	0
Shale, bony			8
Coal, bony, neglected	*Upper Freeport*		1½
Coal, good, sampled	*Upper Freeport*	3	3
Clay, gray, plastic		2	0

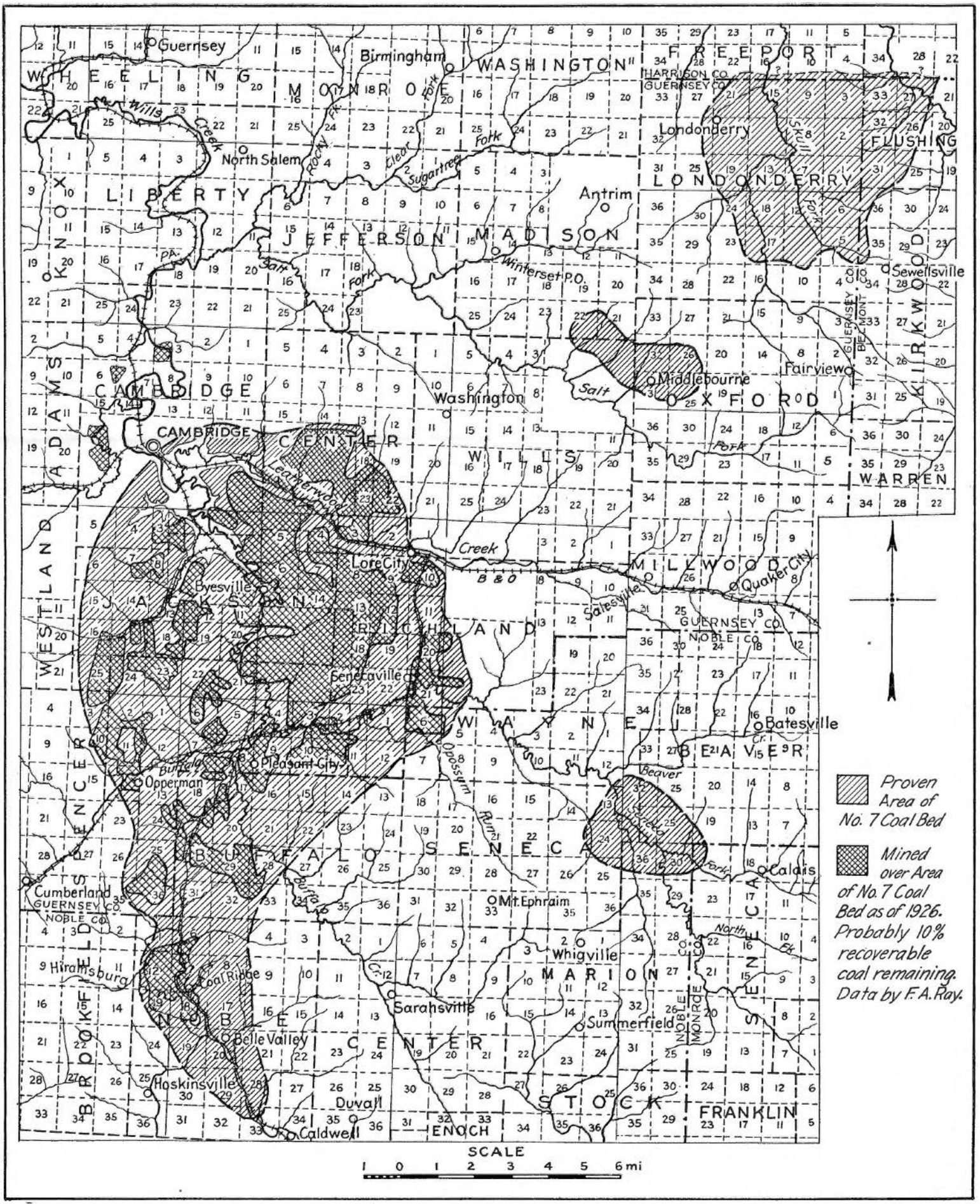
Proximate analysis

	As received	Moisture free
Moisture	3.17	0.00
Volatile matter	36.96	38.17
Fixed carbon	54.27	56.04
Ash	5.60	5.79
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	75.63	78.11
Hydrogen	5.35	5.16
Oxygen	10.05	7.46
Nitrogen	1.33	1.37
Sulphur	2.04	2.11
Ash	5.60	5.79
	100.00	100.00

[1]Geological Survey Ohio, Bull. 28, p. 230.



MAP OF THE CAMBRIDGE FIELD OF UPPER FREEPORT, NO. 7 COAL

		As received	Moisture free
Heating value	Calories	7,674	7,926
	B. t. u.	13,813	14,266

Fusion of ash	Incipient	2,315°F.
	Complete	2,408°F.

Sample of Upper Freeport coal taken in 1921 by C. F. Moses from mine of C. A. Johnson, John Brogan farm, southeast Section 35, West Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, good roof		6	0
Coal, good, sampled	*Upper Freeport*	3	1
Parting, shale at top, bone coal in middle, sulphur at bottom, rejected.	*Upper Freeport*		5
Coal, good, sampled	*Upper Freeport*	1	4
Clay		2	0

Proximate analysis

	As received	Moisture free
Moisture*	7.18	0.00
Volatile matter	34.96	37.66
Fixed carbon	48.91	52.69
Ash	8.95	9.65
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.72	71.88
Hydrogen	5.15	4.69
Oxygen	15.41	9.72
Nitrogen	1.25	1.34
Sulphur	2.52	2.72
Ash	8.95	9.65
	100.00	100.00

*High moisture shown is due to very wet mine. Nearly 4 per cent above normal.

		As received	Moisture free
Heating value	Calories	6,705	7,224
	B. t. u.	12,069	13,003

Fusion of ash	Incipient	2,187°F.
	Complete	2,305°F.

Sample of Upper Freeport coal taken in 1916 by J. H. Hance from Moore mine, southeast quarter of Section 23, St. Clair Township, Columbiana County.[1]

[1]United States Bureau of Mines, Bull. 193, pp. 49, 202-3.

		Ft.	In.
Shale, sandy, roof, not measured.			
Shale, black, bituminous, excluded			6
Coal, good, sampled	*Upper Freeport*	1	1½
Coal, bony, sampled			1
Coal, good, sampled			4
Pyrite in clay, excluded			1½
Coal, sampled		1	8½
Coal, bony, excluded			2

Proximate analysis

	As received	Moisture free
Moisture	4.27	0.00
Volatile matter	36.43	38.05
Fixed carbon	47.66	49.79
Ash	11.64	12.16
	100.00	100.00
Sulphur	3.04	3.18
Air drying loss 2.2 per cent		
Heating value—Calories	6,977	7,288
Heating value—B. t. u.	12,559	13,118

Sample of Upper Freeport coal taken in 1916 by J. H. Hance from Gaston mine, north central part of Section 28, St. Clair Township, Columbiana County.[1]

		Ft.	In.
Shale and sandstone, roof, not measured.			
Coal, bony, excluded			1
Coal, sampled	*Upper Freeport*	1	9
Clay, sampled			⅛
Coal, sampled			4
Clay, sampled			⅛
Coal, sampled			¼
Clay, excluded			½
Coal, sampled			5½
Clay, excluded			1½
Coal, sampled			3½
Clay, floor			3

Proximate analysis

	As received	Moisture free
Moisture	5.27	0.00
Volatile matter	36.28	38.30
Fixed carbon	49.51	52.26
Ash	8.94	9.44
	100.00	100.00
Sulphur	4.01	4.23
Air drying loss 3.0 per cent		

[1]United States Bureau of Mines, Bull. 193, pp. 49, 201.

		As received	Moisture free
Heating value	Calories	7,118	7,514
	B. t. u.	12,812	13,525

Sample of Upper Freeport coal taken in 1921 by W. Stout and C. F. Moses from No. 2 mine of the Seger Fuel Co., east central Section 9, Madison Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Shale and shaly sandstone		10	0
Shale, "draw slate"			4
Pyrite, excluded			¼
Coal, good, sampled	*Upper Freeport*	2	0
Shale, carbonaceous, sampled			½
Coal, good, sampled			11
Shale, rejected			1
Coal, good, sampled			6

Proximate analysis

	As received	Moisture free
Moisture	2.45	0.00
Volatile matter	36.97	37.89
Fixed carbon	49.95	51.22
Ash	10.63	10.89
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.39	71.12
Hydrogen	5.07	4.92
Oxygen	9.90	7.94
Nitrogen	1.21	1.24
Sulphur	3.80	3.89
Ash	10.63	10.89
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,152	7,331
	B. t. u.	12,874	13,196

Fusion of ash	Incipient	2,312°F.
	Complete	2,482°F.

Sample of Upper Freeport coal taken in 1916 by J. H. Hance from mine of Kirk-Dunn Coal Co., at West Point, central Section 9, Madison Township, Columbiana County.[1]

Sample taken 1,800 feet west of south of main entry.

	Ft.	In.
Shale under sandstone, roof.		
Shale, chocolate, excluded.		
Shale, bituminous, coaly, excluded	2	3

[1]United States Bureau of Mines, Bull. 193, pp. 50, 206–7.

		Ft.	In.
Coal, sampled	*Upper Freeport*	1	3½
Mother coal, excluded			⅛
Coal, sampled			5
Pyrite in clay, excluded			⅜
Coal, sampled			7
Coal with 1/16 inch "mother coal", sampled			5
Coal, sampled			8
Clay, bituminous, excluded			1½
Coal, sampled		1	0
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.37	0.00
Volatile matter	37.89	39.21
Fixed carbon	51.68	53.48
Ash	7.06	7.31
	100.00	100.00
Sulphur	2.92	3.02
Air drying loss 1.5 per cent		
Heating value—Calories	7,471	7,731
Heating value—B. t. u.	13,448	13,916

A second sample from same mine, taken 500 feet northeast of entry.[1]

		Ft.	In.
Shale, under sandstone, roof.			
Shale, chocolate, excluded			6
Shale, bituminous, coaly, excluded			5
Coal, sampled	*Upper Freeport*	1	0
Pyrite in clay, sampled			1/16
Coal, sampled			4
Pyrite in clay, excluded			3/16
Coal, sampled		1	10
Clay, bituminous, excluded			2½
Coal, sampled		1	0
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.77	0.00
Volatile matter	38.32	39.82
Fixed carbon	49.93	51.89
Ash	7.98	8.29
	100.00	100.00

[1]Idem

	As received	Moisture free
Sulphur	3.65	3.79

Air drying loss 1.8 per cent

		As received	Moisture free
Heating value	Calories	7,398	7,688
	B. t. u.	13,316	13,838

Mixture of samples taken 500 feet northeast of entry and 1,800 feet west of south of main entry.[1]

Proximate analysis

	As received	Moisture free
Moisture	3.60	0.00
Volatile matter	37.80	39.21
Fixed carbon	51.22	53.13
Ash	7.38	7.66
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	73.68	76.43
Hydrogen	5.35	5.13
Oxygen	8.53	5.53
Nitrogen	1.85	1.92
Sulphur	3.21	3.33
Ash	7.38	7.66
	100.00	100.00

Air drying loss 1.6 per cent

		As received	Moisture free
Heating value	Calories	7,439	7,716
	B. t. u.	13,390	13,889

Sample of Upper Freeport coal taken in 1916 by J. H. Hance from Smith mine, three miles northwest of Wellsville, northwest Section 18, Yellow Creek Township, Columbiana County.[2]

		Ft.	In
Shale, sandy, and shaly sandstone, roof, not measured.			
Coal, bony, sampled	*Upper Freeport*		1
Coal, sampled		1	0
Clay, black, sampled			$\frac{3}{16}$
Coal, sampled			$6\frac{1}{2}$
Clay, black, sampled			$\frac{1}{2}$
Coal, sampled			$3\frac{1}{2}$
Clay, black, sampled			$\frac{1}{4}$
Coal, sampled			$6\frac{1}{2}$
Clay, black, sampled			$\frac{1}{4}$
Coal, sampled		1	$9\frac{1}{4}$

[1]Idem.
[2]United States Bureau of Mines, Bull. 193, pp. 50, 205–6.

Proximate analysis

	As received	Moisture free
Moisture	3.43	0.00
Volatile matter	37.81	39.15
Fixed carbon	51.28	53.10
Ash	7.48	7.75
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	74.31	76.95
Hydrogen	5.53	5.33
Oxygen	8.34	5.48
Nitrogen	1.48	1.53
Sulphur	2.86	2.96
Ash	7.48	7.75
	100.00	100.00

Air drying loss 1.4 per cent

		As received	Moisture free
Heating value	Calories	7,425	7,689
	B. t. u.	13,365	13,840

Sample of Upper Freeport coal taken in 1916 by J. H. Hance from Householder mine, one and one-fourth miles northwest of Wellsville, Section 11, Yellow Creek Township, Columbiana County.[1]

		Ft.	In.
Sandstone, roof, not measured.			
Coal, bony, excluded	*Upper Freeport*		1
Coal, sampled			4¾
Clay, black, sampled			⅝
Coal, sampled			7½
Clay, sampled			¼
Coal, sampled			9
Clay and bone, excluded			¾
Coal, sampled			9

Proximate analysis

	As received	Moisture free
Moisture	5.13	0.00
Volatile matter	38.01	40.07
Fixed carbon	48.58	51.20
Ash	8.28	8.73
	100.00	100.00
Sulphur	3.78	3.98

Air drying loss 2.9 per cent

Heating value	Calories	7,200	7,590
	B. t. u.	12,960	13,662

Sample of Upper Freeport coal taken in 1916 by J. H. Hance from mine of McLain Fire Brick Co., one-half mile northeast of New Salisbury, southeast quarter of Section 34, Yellow Creek Township, Columbiana County.[2]

[1]United States Bureau of Mines, Bull. 193, pp. 50, 204–5.
[2]United States Bureau of Mines, Bull. 193, pp. 50, 203–4.

		Ft.	In.
Shale and sandstone, roof, not measured.			
Shale, chocolate-colored, rejected			3½
Clay, black, bituminous, rejected			¼
Coal, sampled	*Upper Freeport*	1	3½
Clay and pyrite, rejected			1⅛
Coal, sampled		1	10½
Clay, rejected			1¼
Coal, sampled			10½

Proximate analysis

	As received	Moisture free
Moisture	3.46	0.00
Volatile matter	36.74	38.06
Fixed carbon	48.87	50.62
Ash	10.93	11.32
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.89	72.39
Hydrogen	5.24	5.03
Oxygen	8.28	5.40
Nitrogen	1.38	1.43
Sulphur	4.28	4.43
Ash	10.93	11.32
	100.00	100.00

Air drying loss 1.5 per cent

		As received	Moisture free
Heating value	Calories	7,073	7,326
	B. t. u.	12,731	13,187

Sample of Upper Freeport coal taken in 1921 by W. Stout and C. F. Moses from mine of Walters Coal Co., central Section 35, Washington Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray		5	0
Coal, *Mahoning*		3	8
Shale and covered		44	9
Coal, good, sampled	*Upper Freeport*	2	1
Shale, rejected			2½
Coal, good, sampled		2	6½
Shale, rejected			2
Coal, good, sampled		1	8
Clay and shale		11	0

Proximate analysis

	As received	Moisture free
Moisture	3.42	0.00
Volatile matter	38.66	40.03
Fixed carbon	49.18	50.92
Ash	8.74	9.05
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.45	72.94
Hydrogen	5.17	4.96
Oxygen	10.71	7.96
Nitrogen	1.32	1.36
Sulphur	3.61	3.73
Ash	8.74	9.05
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,221	7,477
	B. t. u.	12,998	13,459
Fusion of ash	Incipient	2,454°F.	
	Complete	2,552°F.	

Sample of Upper Freeport coal taken in 1916 by J. H. Hance from Yellow Creek mine, of the Yellow Creek Coal and Clay Co., Section 14, Saline Township, Jefferson County.[1]

Measured 30 feet west of mouth of entry.

		Ft.	In.
Shale and sandstone, roof, not measured.			
Shale, bituminous, rejected			4½
Coal, sampled	*Upper Freeport*	4	2½
Clay, rejected			1½
Coal, sampled		1	7
Clay, rejected			¾
Coal, sampled		1	2
Coal, bony, rejected			3

Proximate analysis

	As received	Moisture free
Moisture	4.75	0.00
Volatile matter	38.28	40.19
Fixed carbon	51.91	54.50
Ash	5.06	5.31
	100.00	100.00
Sulphur	1.76	1.85

Air drying loss 2.7 per cent

Heating value	Calories	7,480	7,853
	B. t. u.	13,464	14,135

Measured in same mine 50 feet southwest of opening.[2]

		Ft.	In.
Shale and sandstone, roof, not measured.			
Coal, bony, rejected			2½
Coal, sampled		1	6
Coal, bony, and clay, rejected	*Upper Freeport*		1
Coal, sampled		1	0
Coal, bony, and clay, rejected			1¾
Coal, sampled		1	1½

[1]United States Bureau of Mines, Bull. 193, pp. 51, 210–11.
[2]Idem.

Proximate analysis

	As received	Moisture free
Moisture	3.43	0.00
Volatile matter	36.26	37.55
Fixed carbon	49.57	51.33
Ash	10.74	11.12
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.66	72.13
Hydrogen	5.15	4.94
Oxygen	8.03	5.16
Nitrogen	1.37	1.42
Sulphur	5.05	5.23
Ash	10.74	11.12
	100.00	100.00

Air drying loss 1.5 per cent

		As received	Moisture free
Heating value	Calories	7,068	7,319
	B. t. u.	12,722	13,174

Sample of Upper Freeport coal taken in 1916 by J. H. Hance from the mine of Robert W. Nicholson, near Irondale, Section 26, Saline Township, Jefferson County.[1]

		Ft.	In.
Shale and sandstone, roof, not measured.			
Clay, bituminous, excluded			$\frac{3}{4}$
Coal, sampled	*Upper Freeport*		$10\frac{7}{8}$
Clay, black, sampled			$\frac{3}{16}$
Coal, sampled			$5\frac{1}{8}$
Pyrite, irregular, sampled			$\frac{1}{16}$
Coal, sampled		1	$11\frac{1}{2}$
Clay, excluded			$1\frac{1}{4}$
Coal, sampled			10
Coal, bony, excluded			$2\frac{1}{2}$

Proximate analysis

	As received	Moisture free
Moisture	3.73	0.00
Volatile matter	36.54	37.95
Fixed carbon	51.24	53.23
Ash	8.49	8.82
	100.00	100.00
Sulphur	2.87	2.98

Air drying loss 1.8 per cent

		As received	Moisture free
Heating value	Calories	7,290	7,572
	B. t. u.	13,122	13,630

[1]United States Bureau of Mines, Bull. 193, pp. 51, 209.

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from the wagon mine of S. G. Hathaway, northwest Section 2, Monroe Township, Harrison County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Upper Freeport*	1	7½
Mother coal, sampled			½
Coal, sampled			3¼
Mother coal, sampled			¼
Coal, sampled			3¼
Shale, sampled			¼
Coal, sampled			5
Shale, rejected			1¼
Coal, sampled			5
Shale, sampled			¼
Coal, sampled			2
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.84	0.00
Volatile matter	36.01	38.65
Fixed carbon	46.88	50.32
Ash	10.27	11.03
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.22	72.16
Hydrogen	5.16	4.72
Oxygen	13.30	7.75
Nitrogen	1.42	1.52
Sulphur	2.63	2.82
Ash	10.27	11.03
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,650	7,138
	B. t. u.	11,970	12,848

Fusion of ash	Incipient	2,316°F.
	Complete	2,460°F.

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from Crab Orchard mine, of the Crab Orchard Mining Co., southeast corner of Section 18, Freeport Township, Harrison County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, tender.			
Coal, sampled	*Upper Freeport*	1	9½
Coal, bony, rejected			¾
Coal, bony, sampled			4
Coal, sampled		1	4¾
Coal, bony, sampled			2½
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	6.17	0.00
Volatile matter	38.18	40.69
Fixed carbon	47.72	50.86
Ash	7.93	8.45
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.51	74.08
Hydrogen	5.28	4.89
Oxygen	12.25	7.22
Nitrogen	1.41	1.50
Sulphur	3.62	3.86
Ash	7.93	8.45
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,002	7,462
	B. t. u.	12,604	13,432

Fusion of ash	Incipient	2,316°F.
	Complete	2,460°F.

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from Maple Leaf No. 1 mine, operated by The New Pocock Coal Co., west central Section 28, Mill Township, Tuscarawas County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Upper Freeport*	2	4¼
Shale, bony, rejected			¾
Coal, sampled		1	¾
Coal, bony, rejected			3
Coal, sampled		1	3¼
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.32	0.00
Volatile matter	37.66	40.20
Fixed carbon	49.48	52.82
Ash	6.54	6.98
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.78	75.56
Hydrogen	5.26	4.87
Oxygen	13.08	7.95
Nitrogen	1.43	1.53
Sulphur	2.91	3.11
Ash	6.54	6.98
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,985	7,456
	B. t. u.	12,573	13,421

Fusion of ash	Incipient	2,316°F.
	Complete	2,442°F.

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from mine of Barkley and Plotts, northeast quarter of Section 31, Rush Township, Tuscarawas County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, tender, roof.			
Coal, sampled	*Upper Freeport*	2	6
Coal, bony, rejected			¾
Coal, sampled		1	2¼
Coal, bony, rejected			3¼
Coal, sampled		1	7
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	6.38	0.00
Volatile matter	39.69	42.39
Fixed carbon	47.02	50.22
Ash	6.91	7.39
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.42	74.15
Hydrogen	5.35	4.96
Oxygen	13.80	8.68
Nitrogen	1.39	1.48
Sulphur	3.13	3.34
Ash	6.91	7.39
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,005	7,356
	B. t. u.	12,609	13,240

Fusion of ash	Incipient	2,323°F.
	Complete	2,460°F.

Sample of Upper Freeport coal taken in 1902 by B. A. Eisenlohr from mine of Wm. Darr, Section 22, Clark Township, Coshocton County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, tender.			
Coal, impure, rejected	*Upper Freeport*	2	5
Coal, upper bench, sampled			4
Shale, rejected			2
Coal, lower bench, sampled			6
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.40	0.00
Volatile matter	37.92	40.51
Fixed carbon	52.49	56.08
Ash	3.19	3.41
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.72	77.69
Hydrogen	5.67	5.30
Oxygen	15.16	10.12
Nitrogen	1.25	1.33
Sulphur	2.01	2.15
Ash	3.19	3.41
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,325	7,826
	B. t. u.	13,185	14,086

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from Murray Hill mine, operated by Akron Coal Co., one-half mile north of Klondyke, southwest Center Township, Guernsey County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, bony, and clay, rejected.....	*Upper Freeport*		1
Coal, sampled.....		2	2½
Mother coal, sampled.....			¾
Coal, sampled.....			8½
Coal, bony, sampled.....			¾
Coal, sampled.....			7¼
Mother coal, sampled.....			¾
Coal, sampled.....			8¼
Shale, parting, rejected.....			2½
Coal, sampled.....		1	2½
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture.....	6.47	0.00
Volatile matter.....	35.90	38.38
Fixed carbon.....	51.85	55.44
Ash.....	5.78	6.18
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	72.59	77.61
Hydrogen.....	5.41	5.01
Oxygen.....	13.68	8.48
Nitrogen.....	1.41	1.51
Sulphur.....	1.13	1.21
Ash.....	5.78	6.18
	100.00	100.00

		As received	Moisture free
Heating value.....	Calories	7,076	7,565
	B. t. u.	12,736	13,617

Fusion of ash.....	Incipient	2,541°F.
	Complete	2,606°F.

Sample of Upper Freeport coal taken in 1905 by J. W. Groves from Forsythe mine of the Forsythe Coal Co., at Danford, in the eastern half of military lot number 30, Center Township, Guernsey County.[1]

[1]United States Geological Survey, Bull. 290, pp. 156-7; Bureau of Mines, Bull. 22, pp. 145, 666.

Sample taken 3,700 feet northeast of bottom of slope.

		Ft.	In.
Shale, roof.			
Coal, sampled			11
Mother coal, sampled			$\frac{1}{8}$
Coal, sampled		1	6
Mother coal, sampled			$\frac{1}{8}$
Coal, sampled			7
Niggerhead, excluded	*Upper Freeport*		1
Coal, sampled		1	3
Shale, sampled			$\frac{1}{4}$
Coal, sampled			1
Shale, excluded			$2\frac{1}{2}$
Coal, sampled		1	6
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.80	0.00
Volatile matter	36.89	39.16
Fixed carbon	50.73	53.85
Ash	6.58	6.99
	100.00	100.00
Sulphur	2.62	2.78

Air drying loss 2.2 per cent

Sample from same mine, 2,600 feet northwest of bottom of slope.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled		2	10
Niggerhead, excluded			$1\frac{1}{4}$
Coal, sampled			6
Mother coal, and pyrite, sampled			$\frac{1}{4}$
Coal, sampled	*Upper Freeport*		$5\frac{1}{2}$
Shale, excluded			1
Coal, sampled			2
Shale, excluded			$2\frac{1}{2}$
Coal, sampled		1	3
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.28	0.00
Volatile matter	35.81	38.21
Fixed carbon	50.61	54.00
Ash	7.30	7.79
	100.00	100.00

[1]Idem.

	As received	Moisture free
Sulphur	3.55	3.79

Air drying loss 2.6 per cent

Heating value	Calories	7,056	7,529
	B. t. u.	12,701	13,552

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from Rigby mine, operated by Akron Coal Co., central Section 20, Richland Township, Guernsey County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone.			
Shale, roof.			
Coal, sampled		1	6
Coal, bony, sampled			1
Coal, sampled	*Upper Freeport*	1	5
Shale, bony, rejected			2½
Coal, sampled			9¼
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	4.98	0.00
Volatile matter	36.42	38.33
Fixed carbon	51.36	54.05
Ash	7.24	7.62
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.99	75.76
Hydrogen	5.27	4.97
Oxygen	12.69	8.70
Nitrogen	1.43	1.50
Sulphur	1.38	1.45
Ash	7.24	7.62
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,094	7,466
	B. t. u.	12,769	13,438

Fusion of ash	Incipient	2,298°F.
	Complete	2,406°F.

Sample of Upper Freeport coal taken in 1914 by D. D. Condit from Cleveland mine of Morris Coal Co., one-fourth mile southeast of Senecaville, central Section 21, Richland Township, Guernsey County.[1]

[1]United States Geological Survey, Bull. 621, pp. 265, 333.

Sample taken 5,200 feet east of shaft.

		Ft.	In.
Shale and sandstone, roof.			
Coal, sampled		1	6
"Mother coal", sampled			¼
Coal, sampled			8
Shale, bony, excluded			1
Coal, sampled			7
"Mother coal", sampled			¼
Coal, sampled			4
"Mother coal", sampled	*Upper Freeport*		¼
Coal, sampled			8
Shale, bony, excluded			2
Coal, sampled			9
"Mother coal", excluded			½
Coal, sampled			4
"Mother coal", excluded			½
Coal, sampled			9
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.37	0.00
Volatile matter	35.80	37.83
Fixed carbon	50.78	53.66
Ash	8.05	8.51
	100.00	100.00
Sulphur	1.64	1.73
Air drying loss 3.2 per cent		
Heating value—Calories	7,102	7,505
Heating value—B. t. u.	12,784	13,509

Sample from same mine, measured 10,500 feet north of shaft.[1]

		Ft.	In.
Shale or sandstone, roof.			
Coal, sampled			8
"Mother coal", sampled			½
Coal, sampled		1	0
"Mother coal", sampled			½
Coal, sampled			7
Coal, bony, excluded			¾
Coal, sampled			6
"Mother coal", sampled	*Upper Freeport*		¼
Coal, sampled			8
"Mother coal", sampled			¼
Coal, sampled			6
Coal, bony, excluded			2
Coal, sampled			4
Coal, bony, excluded			1
Coal, sampled			7
Clay, floor.			

[1] Idem.

Proximate analysis

	As received	Moisture free
Moisture	6.38	0.00
Volatile matter	33.67	35.96
Fixed carbon	52.14	55.70
Ash	7.81	8.34
	100.00	100.00
Sulphur	2.16	2.31
Air drying loss 4.1 per cent		
Heating value..... Calories	7,015	7,493
Heating value..... B. t. u.	12,627	13,487

Mixture of samples from above mine taken 5,000 feet east of shaft and 10,500 feet north of shaft.[1]

Proximate analysis

	As received	Moisture free
Moisture	6.00	0.00
Volatile matter	34.22	36.40
Fixed carbon	51.95	55.27
Ash	7.83	8.33
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.38	75.93
Hydrogen	5.38	5.01
Oxygen	12.11	7.22
Nitrogen	1.32	1.40
Sulphur	1.98	2.11
Ash	7.83	8.33
	100.00	100.00

Air drying loss 3.7 per cent

	As received	Moisture free
Heating value..... Calories	7,067	7,518
Heating value..... B. t. u.	12,721	13,532

Sample of Upper Freeport coal taken in 1914 by D. D. Condit from Black Top mine of the Morris Coal Co., one and one-half miles southwest of Lore City, southeast quarter of Section 8, Richland Township, Guernsey County.[2]

Measured 6,200 feet south, 15° east of shaft.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Upper Freeport*	2	6
Coal, bony, sampled			1½
Coal, sampled		1	2½
Shale, bony, excluded			2
Coal, sampled			10
Clay, floor.			

[1]United States Geological Survey, Bull. 621, p. 334.
[2]United States Geological Survey, Bull. 621, pp. 265, 334.

Proximate analysis

	As received	Moisture free
Moisture	6.09	0.00
Volatile matter	35.22	37.50
Fixed carbon	51.76	55.12
Ash	6.93	7.38
	100.00	100.00
Sulphur	1.62	1.72
Air drying loss 3.8 per cent		
Heating value..... Calories	7,077	7,536
Heating value..... B. t. u.	12,739	13,565

Sample from above mine measured 7,300 feet south, 12° west of shaft.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled		2	3
Coal, bony, sampled			2½
Coal, sampled	*Upper Freeport*	1	7
Shale, bony, excluded			2½
Coal, sampled		1	9
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.95	0.00
Volatile matter	35.73	37.99
Fixed carbon	50.37	53.56
Ash	7.95	8.45
	100.00	100.00
Sulphur	2.15	2.28
Air drying loss 3.4 per cent		
Heating value..... Calories	7,034	7,479
Heating value..... B. t. u.	12,661	13,462

Mixture of samples from above mine measured 6,200 feet south 15° east of shaft and 7,300 feet south 12° west of shaft.[2]

[1]Idem.

[2]United States Geological Survey, Bull. 621, p. 334.

Proximate analysis

	As received	Moisture free
Moisture	6.07	0.00
Volatile matter	35.04	37.30
Fixed carbon	51.56	54.90
Ash	7.33	7.80
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.24	75.84
Hydrogen	5.37	5.00
Oxygen	12.72	7.80
Nitrogen	1.39	1.48
Sulphur	1.95	2.08
Ash	7.33	7.80
	100.00	100.00

Air drying loss 3.6 per cent

		As received	Moisture free
Heating value	Calories	7,062	7,518
	B. t. u.	12,712	13,532

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from Buffalo mine, operated by Cambridge Collieries Co., one and one-fourth miles north of Derwent, north central Valley Township, Guernsey County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone.			
Shale, roof.			
Coal, sampled	*Upper Freeport*		4½
Mother coal, sampled			½
Coal, sampled		2	4
Coal, bony, rejected			1
Coal, sampled		1	6½
Coal, bony, rejected			2½
Coal, sampled		1	2
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	5.32	0.00
Volatile matter	36.86	38.93
Fixed carbon	51.45	54.34
Ash	6.37	6.73
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.36	76.43
Hydrogen	5.32	5.00
Oxygen	13.15	8.88
Nitrogen	1.41	1.49
Sulphur	1.39	1.47
Ash	6.37	6.73
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,133	7,534
	B. t. u.	12,840	13,561

Fusion of ash	Incipient	2,590°F.
	Complete	2,663°F.

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from Maple Leaf No. 2 mine of the Pocock Coal Co., southeast Section 11, southwest Valley Township, Guernsey County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone.			
Shale, roof		10 to 12	0
Coal, sampled	*Upper Freeport*		11½
Mother coal, sampled			½
Coal, sampled		1	8
Coal, bony, rejected			1½
Coal, sampled		1	11
Coal, bony, rejected			2
Coal, sampled			10½
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	5.07	0.00
Volatile matter	38.65	40.71
Fixed carbon	48.31	50.89
Ash	7.97	8.40
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.32	74.08
Hydrogen	5.20	4.89
Oxygen	12.09	7.97
Nitrogen	1.58	1.67
Sulphur	2.84	2.99
Ash	7.97	8.40
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,976	7,348
	B. t. u.	12,556	13,226

Fusion of ash	Incipient	2,406°F.
	Complete	2,494°F.

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from Walhonding No. 2 mine, operated by Cambridge Collieries Co., west central Section 11, southeast Valley Township, Guernsey County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone.			
Shale, roof.			
Coal, bony, rejected	*Upper Freeport*		4½
Shale, rejected			4½
Coal, sampled		1	7½
Mother coal, sampled			1½
Coal, sampled			10½
Shale, bony, rejected			3
Coal, sampled		1	7½
Shale, bony, rejected			2¼
Coal, sampled		1	½
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	5.78	0.00
Volatile matter	36.45	38.69
Fixed carbon	51.38	54.53
Ash	6.39	6.78
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.19	76.62
Hydrogen	5.31	4.96
Oxygen	13.04	8.38
Nitrogen	1.30	1.38
Sulphur	1.77	1.88
Ash	6.39	6.78
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,106	7,542
	B. t. u.	12,790	13,575

Fusion of ash	Incipient	2,494°F.
	Complete	2,566°F.

Sample of Upper Freeport coal taken in 1914 by D. D. Condit from Walhonding No. 2 mine of the Cambridge Collieries Co., west central Section 11, one mile southeast of Hartford, southeast Valley Township, Guernsey County.[1]

Sample taken 600 feet southeast of shaft.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Upper Freeport*		2
"Mother coal", sampled			¼
Coal, sampled			8
"Mother coal", excluded			½
Coal, sampled		2	0
"Mother coal", excluded			½
Coal, sampled			7
"Mother coal", sampled			¼
Coal, sampled			8
Clay, excluded			¾
Coal, sampled			6
Coal, bony, excluded			1½
Coal, sampled		1	2
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.88	0.00
Volatile matter	34.07	36.58
Fixed carbon	53.30	57.24
Ash	5.75	6.18
	100.00	100.00

[1]United States Geological Survey, Bulletin 621, pp. 264, 333.

	As received	Moisture free
Sulphur	0.84	0.90
Air drying loss 4.2 per cent		
Heating value — Calories	7,104	7,628
Heating value — B. t. u.	12,787	13,732

From above mine, measured 3,400 feet northwest of shaft.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled	*Upper Freeport*	1	9
"Mother coal", excluded			½
Coal, sampled		1	6
"Mother coal", sampled			¼
Coal, sampled			4
"Mother coal", excluded			½
Coal, sampled			9
Shale, bony, excluded			1
Coal, sampled			10
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.25	0.00
Volatile matter	36.16	38.57
Fixed carbon	52.29	55.78
Ash	5.30	5.65
	100.00	100.00
Sulphur	0.88	0.94
Air drying loss 3.6 per cent		
Heating value — Calories	7,224	7,705
Heating value — B. t. u.	13,003	13,869

Mixture of samples taken 600 feet southeast of shaft and 3,400 feet northwest of shaft.[2]

Proximate analysis

	As received	Moisture free
Moisture	6.49	0.00
Volatile matter	35.41	37.87
Fixed carbon	52.57	56.22
Ash	5.53	5.91
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	73.41	78.50
Hydrogen	5.49	5.10
Oxygen	13.32	8.08
Nitrogen	1.37	1.47
Sulphur	0.88	0.94
Ash	5.53	5.91
	100.00	100.00

Air drying loss 3.9 per cent

[1]Idem.
[2]United States Geological Survey, Bulletin 621, p. 333.

		As received	Moisture free
Heating value	Calories	7,189	7,688
	B. t. u.	12,940	13,838

Sample of Upper Freeport coal taken in 1925 by P. R. Maxey and T. R. Meyers from Caldwell mine, operated by Cambridge Collieries Co., northwest Section 33, Noble Township, Noble County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Upper Freeport*	4	3½
Shale, rejected			3
Coal, sampled		1	5½
Shale, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	4.77	0.00
Volatile matter	37.06	38.92
Fixed carbon	50.33	52.85
Ash	7.84	8.23
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.57	75.15
Hydrogen	5.26	4.97
Oxygen	11.49	7.62
Nitrogen	1.41	1.48
Sulphur	2.43	2.55
Ash	7.84	8.23
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,028	7,380
	B. t. u.	12,651	13,285

Fusion of ash	Incipient	2,053°F.
	Complete	2,112°F.

Sample of Upper Freeport coal taken in 1913 by H. D. Mason, Jr., and G. W. Salisbury from Noble mine of the Forsythe Coal Co., one mile northwest of Belle Valley, northeast Section 19, Noble Township, Noble County.[1]

Sample taken at face of eighth south entry, 5,700 feet southwest of shaft bottom.

		Ft.	In.
Shale, roof.			
Coal, laminated with mother coal, sampled	*Upper Freeport*		6⅛
Coal, sampled		1	9
Pyrite, sampled			1
Coal, sampled			8
Shale, excluded			3
Coal, sampled			10
Coal, sampled			2
Clay, floor.			

[1]United States Bureau of Mines, Bull. 85, pp. 63, 251.

Proximate analysis

	As received	Moisture free
Moisture	4.88	0.00
Volatile matter	37.76	39.70
Fixed carbon	48.93	51.44
Ash	8.43	8.86
	100.00	100.00
Sulphur	2.95	3.10
Air drying loss 1.4 per cent		
Heating value (Calories)	7,073	7,436
Heating value (B. t. u.)	12,731	13,385

Sample from above mine, at face of room 5 off seventh south entry, 5,600 feet southwest of shaft bottom.[1]

		Ft.	In.
Shale, roof.			
Coal, laminated with mother coal, sampled	*Upper Freeport*		5
Coal, sampled			10¾
Mother coal, sampled			1
Coal, sampled		1	3
Coal, bony, sampled			2½
Coal, sampled		1	6
Shale, excluded			2
Coal, sampled			10
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.13	0.00
Volatile matter	37.17	39.18
Fixed carbon	49.59	52.27
Ash	8.11	8.55
	100.00	100.00
Sulphur	2.99	3.15
Air drying loss 1.5 per cent.		
Heating value (Calories)	7,053	7,435
Heating value (B. t. u.)	12,695	13,383

Mixture of samples taken 5,700 feet southwest of shaft bottom and 5,600 feet southwest of shaft bottom.[2]

[1]Idem.
[2]United States Bureau of Mines, Bull. 85, p. 63.

Proximate analysis

	As received	Moisture free
Moisture	5.15	0.00
Volatile matter	37.34	39.37
Fixed carbon	49.00	51.66
Ash	8.51	8.97
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.51	74.34
Hydrogen	5.42	5.12
Oxygen	11.12	6.89
Nitrogen	1.50	1.58
Sulphur	2.94	3.10
Ash	8.51	8.97
	100.00	100.00

Air drying loss 1.5 per cent

		As received	Moisture free
Heating value	Calories	7,074	7,459
	B. t. u.	12,733	13,426

Sample of Upper Freeport coal taken in 1917 by Wilber Stout and R. E. Lamborn from mine of W. A. Dailey, one mile southeast of Sonora, Section 14, Perry Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale		4	0
Coal, bony, excluded	*Upper Freeport*		9
Coal, good, sampled		1	6
Clay, excluded			1½
Coal, good, sampled		1	9
Clay, siliceous		1	0

Proximate analysis

	As received	Moisture free
Moisture	9.28	0.00
Volatile matter	38.90	42.88
Fixed carbon	43.63	48.09
Ash	8.19	9.03
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.71	72.43
Hydrogen	5.60	5.04
Oxygen	15.91	8.44
Nitrogen	0.97	1.07
Sulphur	3.62	3.99
Ash	8.19	9.03
	100.00	100.00

Air drying loss 4.1 per cent

		As received	Moisture free
Heating value	Calories	6,584	7,257
	B. t. u.	11,851	13,063

Fusion of ash	Incipient	2,057°F.
	Complete	2,107°F.

Sample of Upper Freeport coal taken in 1902 by B. A. Eisenlohr from mine of Zanesville Coal Co., southeast Section 2, Wayne Township, Muskingum County. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone.			
Shale, tender		4	0
Coal, upper bench, sampled	*Upper Freeport*	1	8
Clay, rejected			1
Coal, hard and flinty, sampled		1	10
Coal, lower bench, sampled		2	2
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	5.11	0.00
Volatile matter	35.50	37.41
Fixed carbon	46.79	49.31
Ash	12.60	13.28
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.81	68.30
Hydrogen	5.11	4.78
Oxygen	12.39	8.27
Nitrogen	1.25	1.32
Sulphur	3.84	4.05
Ash	12.60	13.28
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,558	6,911
	B. t. u	11,804	12,440

Sample of Upper Freeport coal taken in 1917 by Wilber Stout from mine of T. Olden, on Bluerock Creek, southeast quarter of Section 11, Harrison Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof		15	0
Coal, good, sampled	*Upper Freeport*	1	3
Shale, with much pyrite, rejected			1½
Coal, good, sampled		2	10
Clay, siliceous		3	0

Proximate analysis

	As received	Moisture free
Moisture	4.27	0.00
Volatile matter	45.63	47.67
Fixed carbon	41.07	42.90
Ash	9.03	9.43
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.98	71.01
Hydrogen	5.36	5.11
Oxygen	11.28	7.82
Nitrogen	1.12	1.17
Sulphur	5.23	5.46
Ash	9.03	9.43
	100.00	100.00

Air drying loss 1.2 per cent

		As received	Moisture free
Heating value	Calories	6,967	7,278
	B. t. u.	12,541	13,100
Fusion of ash	Incipient	1,985°F.	
	Complete	2,082°F.	

Sample of Upper Freeport coal taken in 1902 by B. A. Eisenlohr from mine of Blue Rock Coal Co., at Stone on the Muskingum River, southeast Section 30, Harrison Township, Muskingum County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, tender.			
Sandstone.			
Coal, cannel, shaly, rejected	*Upper Freeport*	9 to 11	0
Coal, upper bench, sampled		1	5
Shale, rejected			1
Coal, lower bench, sampled		2	4
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.89	0.00
Volatile matter	42.35	44.53
Fixed carbon	44.98	47.29
Ash	7.78	8.18
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.74	71.22
Hydrogen	5.53	5.25
Oxygen	13.42	9.54
Nitrogen	1.17	1.23
Sulphur	4.36	4.58
Ash	7.78	8.18
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,944	7,301
	B. t. u.	12,499	13,142

Sample of Upper Freeport coal taken in 1902 by B. A. Eisenlohr from mine of Maynard Bros., central Section 26, Brush Creek Township, Muskingum County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, roof.			
Coal, upper bench, sampled	*Upper Freeport*	1	4
Pyrite, rejected			1½
Coal, lower bench, sampled		2	7
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.72	0.00
Volatile matter	43.47	45.62
Fixed carbon	44.25	46.45
Ash	7.56	7.93
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.27	71.65
Hydrogen	5.55	5.28
Oxygen	12.30	8.51
Nitrogen	1.32	1.38
Sulphur	5.00	5.25
Ash	7.56	7.93
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,046	7,395
	B. t. u.	12,683	13,311

Sample of Upper Freeport coal taken in 1902 by E. E. Somermeier from Sander's mine, Section 17, Walnut Township, Gallia County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, upper bench, excluded			
Shale, coal, and clay, excluded	*Upper Freeport*		9½
Coal, lower bench, sampled		2	10
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	7.62	0.00
Volatile matter	32.85	35.56
Fixed carbon	47.14	51.03
Ash	12.39	13.41
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.48	68.71
Hydrogen	5.19	4.70
Oxygen	15.85	9.83
Nitrogen	1.28	1.39
Sulphur	1.81	1.96
Ash	12.39	13.41
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,371	6,896
	B. t. u.	11,468	12,413

Sample of Upper Freeport coal taken in 1901 by E. E. Somermeier from mine of Thomas Cooper, northeast Section 25, Symmes Township, Lawrence County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay and shale.			
Coal, upper bench, sampled		1	3
Clay, rejected			5
Coal, sampled	*Upper Freeport*		3
Shale, rejected			7
Coal, lower bench, sampled		4	0
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	7.13	0.00
Volatile matter	33.65	36.23
Fixed carbon	50.31	54.17
Ash	8.91	9.60
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.09	72.24
Hydrogen	5.33	4.89
Oxygen	16.08	10.49
Nitrogen	1.28	1.37
Sulphur	1.31	1.41
Ash	8.91	9.60
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,716	7,231
	B. t. u.	12,089	13,016

Sample of Upper Freeport coal taken in 1901 by E. E. Somermeier, from mine of G. W. Peach, northeast Section 23, Symmes Township, Lawrence County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, upper bench, excluded			5
Clay, excluded	*Upper Freeport*	1	2
Coal, lower bench, sampled		3	9

Proximate analysis

	As received	Moisture free
Moisture	8.77	0.00
Volatile matter	31.70	34.75
Fixed carbon	50.82	55.70
Ash	8.71	9.55
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.88	73.30
Hydrogen	5.32	4.77
Oxygen	17.08	10.18
Nitrogen	1.25	1.37
Sulphur	0.76	0.83
Ash	8.71	9.55
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,586	7,219
	B. t. u.	11,855	12,994

Sample of Upper Freeport coal taken in 1901 by E. E. Somermeier from mine of William Sneed, east central Section 26, Symmes Township, Lawrence County. Analysis by Lord and Somermeier.

	Ft.	In.
Shale, siliceous.		
Coal, sampled, *Upper Freeport*	3	2
Clay, impure.		

Proximate analysis

	As received	Moisture free
Moisture	8.38	0.00
Volatile matter	31.45	34.33
Fixed carbon	50.08	54.66
Ash	10.09	11.01
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.90	70.83
Hydrogen	5.18	4.64
Oxygen	16.72	10.12
Nitrogen	1.27	1.39
Sulphur	1.84	2.01
Ash	10.09	11.01
	100.00	100.00

Heating value	As received	Moisture free
Calories	6,497	7,091
B. t. u.	11,695	12,764

Sample of Upper Freeport coal taken in 1901 by E. E. Somermeier from mine of Walter Rose, on Elkins Creek, one and one-half miles west of its mouth, Section 21, Aid Township, Lawrence County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, upper bench, sampled	*Upper Freeport*	1	4
Clay, rejected			7
Coal, lower bench, sampled		2	6

Proximate analysis

	As received	Moisture free
Moisture	7.85	0.00
Volatile matter	32.90	35.70
Fixed carbon	47.07	51.08
Ash	12.18	13.22
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.03	68.40
Hydrogen	5.09	4.58
Oxygen	15.79	9.56
Nitrogen	1.25	1.35
Sulphur	2.66	2.89
Ash	12.18	13.22
	100.00	100.00

Heating value	As received	Moisture free
Calories	6,305	6,842
B. t. u.	11,349	12,316

Sample of Upper Freeport coal taken in 1901 by E. E. Somermeier from the Calvin Haskin's mine, southwest Section 25, Aid Township, Lawrence County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, upper bench, not mined		1	0
Shale, very hard, excluded	*Upper Freeport*	1	0
Coal, lower bench, sampled		3	2
Clay, siliceous.			

Proximate analysis

	As received	Moisture free
Moisture	8.37	0.00
Volatile matter	31.80	34.70
Fixed carbon	51.60	56.32
Ash	8.23	8.98
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.94	73.05
Hydrogen	5.21	4.67
Oxygen	17.02	10.46
Nitrogen	1.31	1.43
Sulphur	1.29	1.41
Ash	8.23	8.98
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,596	7,198
	B. t. u.	11,873	12,956

Sample of Upper Freeport coal taken in 1901 by E. E. Somermeier from mine of Thomas Bennett, one mile west of Marion, Section 35, Aid Township, Lawrence County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, roof.			
Coal, upper bench, sampled	*Upper Freeport*	1	0
Shale, rejected	*Upper Freeport*		1½
Coal, lower bench, sampled	*Upper Freeport*	3	0
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	8.45	0.00
Volatile matter	31.25	34.13
Fixed carbon	49.02	53.55
Ash	11.28	12.32
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.20	71.22
Hydrogen	5.10	4.54
Oxygen	16.21	9.50
Nitrogen	1.28	1.40
Sulphur	0.93	1.02
Ash	11.28	12.32
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,405	6,996
	B. t. u.	11,529	12,593

Sample of Upper Freeport coal taken in 1901 by E. E. Somermeier from mine of Frank Kitts, on Dog Fork, two and one-fourth miles north of Rock Camp, Section 16, Lawrence Township, Lawrence County. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone and shale.			
Coal, upper bench, not mined	*Upper Freeport*	1	2
Clay, rejected	*Upper Freeport*		7
Coal, lower bench, sampled	*Upper Freeport*	2	2
Clay, impure.			

Proximate analysis

	As received	Moisture free
Moisture	7.20	0.00
Volatile matter	32.25	34.75
Fixed carbon	49.88	53.75
Ash	10.67	11.50
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.03	70.07
Hydrogen	5.03	4.56
Oxygen	15.69	10.01
Nitrogen	1.25	1.35
Sulphur	2.33	2.51
Ash	10.67	11.50
	100.00	100.00

		As received	Moisture free
Heating value	Calories	6,556	7,065
	B. t. u.	11,801	12,717

CONEMAUGH SERIES[1]

Rocks of Conemaugh age, formerly known as the Lower Barren Coal Measures, form a belt varying from about 10 to 40 miles in width and extending from the Ohio-Pennsylvania-West Virginia State line in Columbiana and Jefferson counties southwest to the Ohio River in Gallia and Lawrence counties. The rocks consist largely of shales and sandstones with decidedly subordinate quantities of limestone and coal. The series, which lies between the Upper Freeport and Pittsburgh coals, varies in thickness from 350 feet in southern Ohio to 475 feet in the eastern part.

MAHONING COAL

The coals of the Conemaugh series are thin, patchy, and of little value. Most important of these is the Mahoning, the position of which in the rock column is shown in the following section:[2]

	Ft.	In.
Conemaugh series		
Coal, *Brush Creek*		4
Shale, gray, part covered	6	8
Shale, shaly sandstone, and covered	29	0
Shale and shaly sandstone	16	0
Shale, dark		6
Coal, *Mahoning*	2	9
Clay, light, plastic	3	9
Shale and shaly sandstone	47	0
Shale, gray	3	0
Shale, dark	1	0
Allegheny series		
Coal	3	3
Shale *Upper Freeport*		1
Coal		9

[1]For an extensive review of this series see Geological Survey Ohio, Bull. 17.
[2]Stout, Wilber, Geological Survey Ohio, Bull. 28, p. 305.

The Mahoning coal is at its best in Columbiana, Carroll, and Jefferson counties, where it has long been mined for railroad shipment. In Columbiana County, Stout assigns an area of 12 square miles where the coal averages 3 feet 3 inches in thickness; 13 square miles with an average of 2 feet 5 inches; and 15 square miles with an average of 1 foot 8 inches. Data for Carroll County are much more meager at the present time. The coal has been mined in northern Jefferson County but not in a large way.

Sections and analyses

Sample of Mahoning coal taken in 1921 by C. F. Moses from mine of Negley Coal Co., north of Negley, northeast corner Section 11, Middleton Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, siliceous		5	0
Coal, bony, neglected	*Mahoning*		6
Coal, good, sampled	*Mahoning*	2	8
Clay, plastic		1	0
Shale and covered		30	0
Coal, *Upper Freeport*		3	0

Proximate analysis

	As received	Moisture free
Moisture	3.22	0.00
Volatile matter	36.76	37.98
Fixed carbon	52.38	54.13
Ash	7.64	7.89
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	73.10	75.54
Hydrogen	5.26	5.07
Oxygen	10.60	7.98
Nitrogen	1.42	1.47
Sulphur	1.98	2.05
Ash	7.64	7.89
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,424	7,614
	B. t. u.	13,363	13,705

Fusion of ash	Incipient	2,094°F.
	Complete	2,179°F.

Sample of Mahoning coal taken in 1921 by W. Stout and C. F. Moses from mine of Seger Fuel Co., near West Point, east central Section 9, Madison Township, Columbiana County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, black, roof		1	0
Coal, bony, sampled	*Mahoning*		2
Coal, good, sampled	*Mahoning*	2	6
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.18	0.00
Volatile matter	36.47	37.67
Fixed carbon	52.21	53.92
Ash	8.14	8.41
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.92	75.31
Hydrogen	5.31	5.13
Oxygen	10.76	8.18
Nitrogen	1.34	1.39
Sulphur	1.53	1.58
Ash	8.14	8.41
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,347	7,587
	B. t. u.	13,224	13,657

Fusion of ash	Incipient	2,251°F.
	Complete	2,360°F.

Sample of Mahoning coal taken in 1916 by J. H. Hance from Dangelo mine, near Wellsville, central Section 15, Yellow Creek Township, Columbiana County.[1]

		Ft.	In.
Shale and sandstone, roof, not measured.			
Coal, sampled	*Mahoning*		10½
Clay and pyrite, excluded			⅞
Coal, sampled			9
Clay and pyrite, excluded			⅝
Coal, sampled		1	1¼
Shale, sandy, excluded			⅛
Coal, sampled			6¾

Proximate analysis

	As received	Moisture free
Moisture	3.15	0.00
Volatile matter	39.32	40.60
Fixed carbon	51.15	52.81
Ash	6.38	6.59
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	75.35	77.80
Hydrogen	5.56	5.38
Oxygen	7.81	5.17
Nitrogen	1.35	1.39
Sulphur	3.55	3.67
Ash	6.38	6.59
	100.00	100.00

Air drying loss 1.1 per cent

		As received	Moisture free
Heating value	Calories	7,548	7,793
	B. t. u.	13,586	14,027

[1]United States Bureau of Mines, Bulletin 193, pp. 50, 204.

Sample of Mahoning (Finley) coal taken in 1904 by W. T. Griswold from country mine, on Island Creek, one mile west of the Ohio River, north Section 34, Island Creek Township, Jefferson County.[1]

		Ft.	In.
Coal, sampled	*Mahoning*	1	5
Shale, excluded			½
Coal, sampled		2	8½

Proximate analysis

	As received	Moisture free
Moisture	3.89	0.00
Volatile matter	36.46	37.94
Fixed carbon	52.25	54.36
Ash	7.40	7.70
	100.00	100.00
Sulphur	3.63	3.78

Air drying loss 1.9 per cent

MASON COAL

The Mason coal, which lies between the Mahoning and the Brush Creek limestone, is best developed in southern Ohio where it in places attains a thickness of 2 feet or a little more and is used by farmers for a local supply. In central and eastern Ohio, however, it is thinner and of no value.

BRUSH CREEK COAL

The Brush Creek coal lies below the Brush Creek limestone. It is thin, patchy, and of little or no worth. In places it is stripped along stream beds for a local supply by farmers.

WILGUS COAL

The Wilgus coal is best developed in Lawrence and Gallia counties in the southern part of the State. Its position is directly or only a few feet below the Cambridge limestone. For this reason it is locally known as the Limestone coal. The bed is at its best in the Symmes Creek Valley of Lawrence County where it ranges from 18 inches to 3 feet 6 inches in thickness and is a local source of fuel. The bed is also of use in Gallia County to the east, but farther north in the State it is thin and of little or no value.

[1]United States Bureau of Mines, Bulletin 22, pp. 147, 670.

Sections and analyses

Sample of Wilgus coal taken in 1928 by W. S. Glock and L. O. Naffziger from the mine of G. A. Payne in south central Section 29, Mason Township, Lawrence County. Analysis by D. J. Demorest.

		Ft.	In.
Limestone, roof.			
Shale.			
Coal, bony, rejected	*Wilgus*		2
Coal, sampled	*Wilgus*	2	0
Coal, bony, rejected	*Wilgus*		1
Shale, gray, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.95	0.00
Volatile matter	39.08	42.00
Fixed carbon	46.42	49.89
Ash	7.55	8.11
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.83	71.82
Hydrogen	5.43	5.01
Oxygen	15.26	9.76
Nitrogen	1.33	1.43
Sulphur	3.60	3.87
Ash	7.55	8.11
	100.00	100.00

Air drying loss 2.8 per cent

		As received	Moisture free
Heating value	Calories	6,649	7,145
	B. t. u.	11,968	12,862

Fusion of ash	Incipient	2,180°F.
	Complete	2,345°F.

Analysis of ash

Moisture at 105°C	0.06
Ignition loss	1.08
Silica, SiO_2	36.21
Alumina, Al_2O_3	17.12
Ferric oxide, Fe_2O_3	40.00
Titania, TiO_2	.69
Phos. oxide, P_2O_5	.21
Lime, CaO	1.83
Magnesia, MgO	0.96
Potassium oxide, K_2O	0.92
Sodium oxide, Na_2O	0.27
Barium oxide, BaO	None
Vanadium oxide, V_2O_5	.36
Sulphur trioxide, SO_3	1.10

Sample of Wilgus coal taken in 1928 by W. S. Glock and L. O. Naffziger from mine of J. G. Bradshaw on Stewart's Ridge, one and three-fourths miles northwest of Sherritts, southwest corner of Section 22, Symmes Township, Lawrence County. Analysis by D. J. Demorest. Sample moist.

		Ft.	In.
Limestone, roof		5	6
Shale, gray, rejected			1
Coal, sampled			2
Coal, bony, rejected			1
Coal, sampled	*Wilgus*	1	2¾
Shale, pyritiferous, rejected			½
Coal, sampled			9⅜
Coal, bony, rejected			4¼
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	8.15	0.00
Volatile matter	38.48	41.89
Fixed carbon	45.90	49.98
Ash	7.47	8.13
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.18	72.05
Hydrogen	5.40	4.89
Oxygen	16.84	10.46
Nitrogen	1.28	1.39
Sulphur	2.83	3.08
Ash	7.47	8.13
	100.00	100.00

Air drying loss 3.16 per cent

		As received	Moisture free
Heating value	Calories	6,575	7,158
	B. t. u.	11,835	12,885

Fusion of ash	Incipient	2,098°F.
	Complete	2,345°F.

Analysis of ash

Moisture at 105°C	0.10
Ignition loss	0.74
Silica, SiO_2	53.91
Alumina, Al_2O_3	16.68
Ferric oxide, Fe_2O_3	23.61
Titania, TiO_2	0.97
Phos. oxide, P_2O_5	0.11
Lime, CaO	1.01
Magnesia, MgO	1.16
Potassium oxide, K_2O	0.94
Sodium oxide, Na_2O	0.29
Barium oxide, BaO	None
Vanadium oxide, V_2O_5	0.13
Sulphur trioxide, SO_3	0.43

ANDERSON COAL

The Anderson coal lies 12 feet above the Cambridge limestone at the type locality in Guernsey County, according to Condit, who rates the coal as one of the most important in the Conemaugh series, and says it has workable thickness in parts of Guernsey, Muskingum, and Morgan counties, but is of less value in other parts of the State. At its best the coal rarely if ever exceeds 3 feet in thickness but it bears a good name among the farmers who use it. For generations its only value will be to people residing in country districts or in villages.

Sections and analyses

Sample of Anderson coal taken in 1917 by W. Stout and R. E. Lamborn from mine of George Wokey, southeastern part of Section 11, Salt Creek Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof		6	0
Coal, sampled	*Anderson*		7
Shale, sampled	*Anderson*		¼
Coal, sampled	*Anderson*	1	5
Clay, siliceous		2	0

Proximate analysis

	As received	Moisture free
Moisture	6.61	0.00
Volatile matter	39.84	42.66
Fixed carbon	44.96	48.14
Ash	8.59	9.20
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.90	73.77
Hydrogen	5.61	5.23
Oxygen	13.50	8.17
Nitrogen	1.32	1.41
Sulphur	2.08	2.22
Ash	8.59	9.20
	100.00	100.00

Air drying loss 3.3 per cent

		As received	Moisture free
Heating value	Calories	6,854	7,339
Heating value	B. t. u.	12,337	13,210

Sample of Anderson coal taken in 1917 by W. Stout and R. E. Lamborn from a strip mine in the abandoned quarries on Cedar Run, east central Section 31, Harrison Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, *Cow Run*		22	0
Shale with irregular layers of ferruginous limestone	*Portersville*		8
Shale, dark, extremely fossiliferous	*Portersville*	1	7
Coal, sampled, *Anderson*		1	8
Clay		1	0

Proximate analysis

	As received	Moisture free
Moisture	5.66	0.00
Volatile matter	42.72	45.28
Fixed carbon	39.92	42.32
Ash	11.70	12.40
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.61	67.43
Hydrogen	5.30	4.95
Oxygen	13.48	8.96
Nitrogen	1.03	1.09
Sulphur	4.88	5.17
Ash	11.70	12.40
	100.00	100.00

Air drying loss 2.7 per cent

		As received	Moisture free
Heating value	Calories	6,579	6,974
	B. t. u.	11,842	12,552

Fusion of ash	Incipient	2,014°F.
	Complete	2,199°F.

Sample of Anderson coal taken in 1914 by D. D. Condit from mine of Andy Slovak, one mile southeast of Hartford at Walhonding, Section 11, Valley Township, Guernsey County.[1]

	Ft.	In.
Sandstone, roof.		
Coal, sampled, *Anderson*	1	10
Shale, floor.		

Proximate analysis

	As received	Moisture free
Moisture	4.33	0.00
Volatile matter	40.21	42.03
Fixed carbon	45.07	47.11
Ash	10.39	10.86
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.30	71.39
Hydrogen	5.37	5.11
Oxygen	10.69	7.15
Nitrogen	1.50	1.57
Sulphur	3.75	3.92
Ash	10.39	10.86
	100.00	100.00

Air drying loss 2.5 per cent

[1]United States Geological Survey, Bull. 621, pp. 264, 333.

		As received	Moisture free
Heating value.....	Calories	6,940	7,254
	B. t. u.	12,492	13,057

BARTON COAL

The place of the Barton coal is above the Ewing limestone and about 40 feet below the Ames. The best known deposit of this bed is in Carroll, Jefferson, and Harrison counties, but even there it has little value. Rarely does it attain 20 inches in thickness, that measurement having been reported by Condit in a mine at Perryville, Carroll County.

HARLEM COAL

The Harlem coal also has little value in Ohio. Harlem Springs, Carroll County, is the type locality and there Condit measured 2 feet 4 inches of this bed. He states that it is also found at numerous places on the river front in Jefferson County. Stout reports only 13 inches as the maximum for this bed in Columbiana County, but makes a more favorable report for Muskingum County where he found as much as 2 feet 8 inches. The bed has been mined in a small way by drifting at Norwich. However, the coal adds but little to the fuel resources of the county.

Sections and analyses

Sample of Harlem coal taken in 1926 by T. R. Meyers and G. W. White from mine of L. E. Gie Coal Co., southeast Section 16, Lee Township, Carroll County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, blue-gray, good top.			
Coal, bony, rejected.....	*Harlem*		4
Coal, good, taken.....		2	2
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture.....	7.07	0.00
Volatile matter.....	36.55	39.33
Fixed carbon.....	50.34	54.17
Ash.....	6.04	6.50
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	71.04	76.44
Hydrogen.....	5.49	5.08
Oxygen.....	15.64	10.06
Nitrogen.....	1.22	1.31
Sulphur.....	0.57	0.61
Ash.....	6.04	6.50
	100.00	100.00

Air drying loss 3.1 per cent

		As received	Moisture free
Heating value	Calories	7,025	7,559
	B. t. u.	12,645	13,606
Fusion of ash	Incipient	2,626°F.	
	Complete	2,710°F.	

OTHER COAL BEDS IN THE CONEMAUGH SERIES

The Duquesne and Elk Lick coals which lie above the Ames limestone are rarely found in Ohio and have no value as a source of fuel. The Lower and Upper Little Pittsburgh coals lie near the top of the Conemaugh series and only a short distance below the great Pittsburgh bed. They also are seldom present in Ohio.

THE MONONGAHELA SERIES

The Monongahela series extends from the base of the Pittsburgh coal to the top of the Waynesburg, and ranges in thickness from about 240 to 270 feet. It forms a broad belt extending from Jefferson and Belmont counties southwest to Meigs, Gallia, and Lawrence, which front on the Ohio River. The rocks are largely shales and sandstones with important fresh water limestones near the horizons of the Pittsburgh, Fishpot, and Meigs Creek coals. Following is a section of the rocks of this series as given by W. Stout for Muskingum County:[1]

	Ft.	In.
Coal, *Waynesburg, No. 11*, rather persistent	1	0
Clay shale, red	27	0
Sandstone, massive, persistent, *Gilboy*	35	0
Shale, dark	1	0
Coal, steady, but thin, *Uniontown, No. 10*	2	0
Clay, calcareous	2	0
Limestones, thin to medium bedded, *Uniontown*	10	0
Clay shale, varying in color and composition	34	0
Limestone, thin to medium bedded, interstratified with clay shale, and marly limestone, *Benwood*	47	0
Sandstone, usually thin, often wanting, *Sewickley*	10	0
Shale and sandstone	16	0
Shale, dark, carbonaceous	3	10
Coal, *Meigs Creek (Sewickley), No. 9*	4	2
Shale, usually red and calcareous	9	0
Limestone, *Fishpot*	10	0
Shale, red, calcareous	5	0
Sandstone, poorly represented, *Pomeroy*	3	6
Coal, *Pomeroy (Redstone) No. 8a*		6
Clay and shale, calcareous	2	0
Limestone, locally present, *Redstone*	4	0
Sandstone, *Upper Pittsburgh*, usually replaced by gray or colored shales	16	0
Shale, dark, siliceous	3	0
Coal, *Pittsburgh, No. 8*, persistent but thin	2	0

[1]Geological Survey of Ohio, Bulletin 21, facing p. 268.

As this and other sections show, there are seven coal beds in the Monongahela series:

Waynesburg, No. 11 coal
Little Waynesburg coal
Uniontown, No. 10 coal
Meigs Creek, Sewickley, No. 9 coal
Fishpot, Lower Meigs Creek, No. 8b coal
Pomeroy, Redstone, No. 8a coal
Pittsburgh, No. 8 coal

PITTSBURGH OR No. 8 COAL

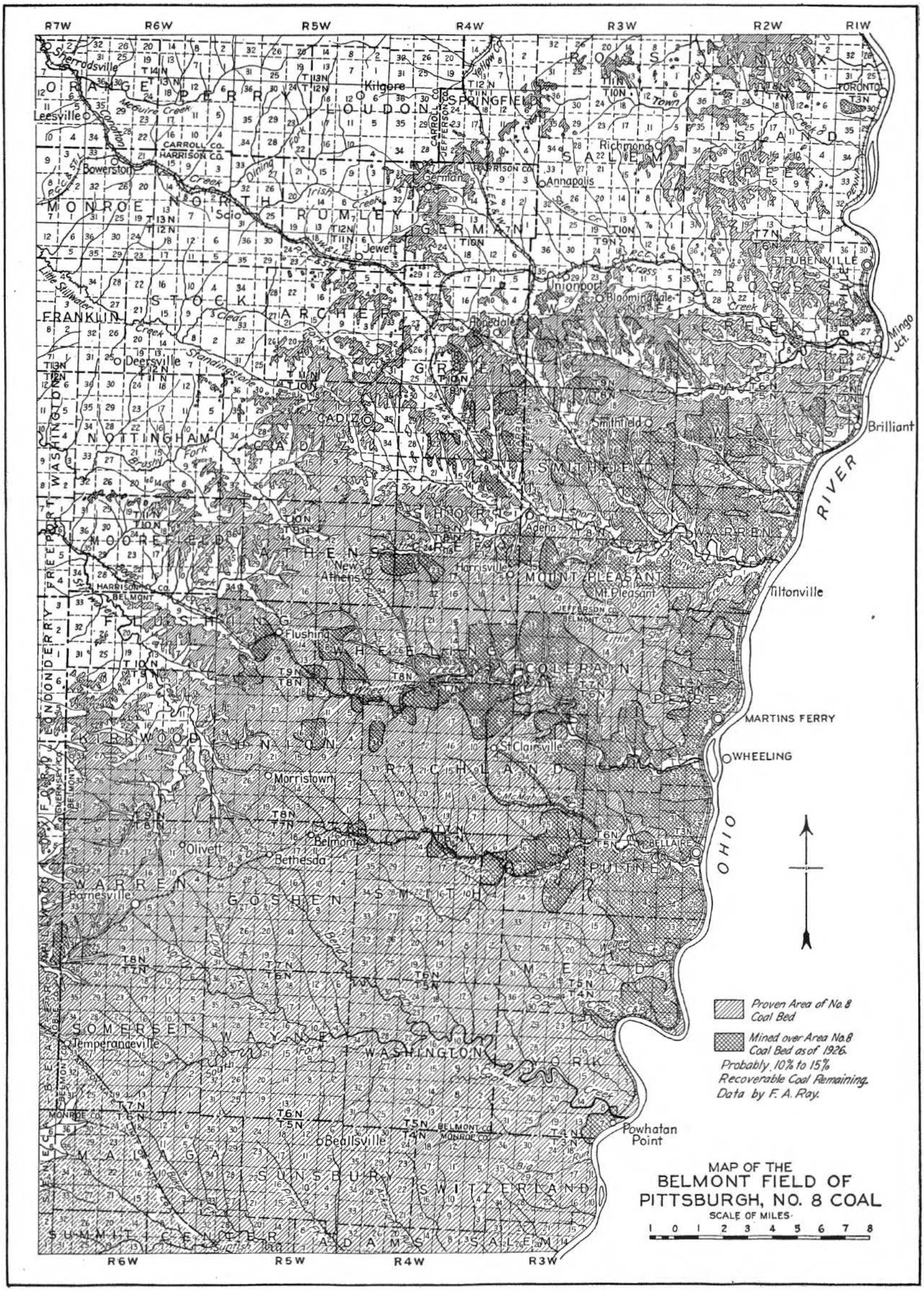
The Pittsburgh is one of the most important coal beds of Ohio. It was the last of the great coal beds to be worked extensively in the State, has the largest area of virgin coal, and will in all probability be the last of the great deposits to be exhausted. The line of outcrop sweeps nearly southwest in a sinuous line from Jefferson County on the north to Lawrence on the south, a distance on a bee-line of at least 170 miles. The maximum width of the area under which this coal is due is about 55 miles, but in most places it is less than half that and in the two southern counties it is in places restricted to narrow ridges.

The Pittsburgh coal forms the base of the Monongahela series, and the following section taken from Condit shows the position of this bed with reference to certain higher ones:[1]

	Ft.	In.
Shales and thin beds of limestone	24	5
Coal, *Meigs Creek, No. 9*	4	0
Shale, sandy	14	0
Coal	..	8
Shale, clayey	6	0
Coal, *Lower Meigs Creek*	3	0
Shales, clayey	2	0
Limestones and thin layers of clay	25	0
Unseen	11	0
Coal, *Redstone*	2	0
Unseen	11	0
Coal, *Pittsburgh, No. 8*	8	0
Clay	5	0
Limestone	4	0

From the standpoint of continuity the Pittsburgh coal of Ohio must be classed with the patchy type, the coal being thin or wanting along many miles of the line of outcrop. The large deposits form three separate areas, which, in order of their importance, are generally known as (1) the Belmont, (2) the Federal Creek, and (3) the Gallia fields.

[1]United States Geological Survey, Prof. Paper 100-B, p. 62.


R7W
R6W
R5W
R4W
R3W
R2W
R1W
Sherrodsville
Leesville
Bowerston
Kilgore
Jewett
German
Annapolis
Richmond
Toronto
Deersville
Cadiz
Smithfield
Adena
New Athens
Harrisville
Mt. Pleasant
Tiltonville
Brilliant
Flushing
St. Clairsville
Morristown
Belmont
Olivett
Bethesda
Barnesville
Temperanceville
Beallsville
Powhatan Point
Union Point
Bloomingdale
Hopedale
Stockdale
Irondale
Mingo Jct.
Martins Ferry
Wheeling
Bellaire
Ohio River
Proven Area of No. 8 Coal Bed
Mined over Area No. 8 Coal Bed as of 1926. Probably 10% to 15% Recoverable Coal Remaining. Data by F. A. Ray.
MAP OF THE BELMONT FIELD OF PITTSBURGH, NO. 8 COAL
SCALE OF MILES
1 0 1 2 3 4 5 6 7 8

Belmont Field

The Belmont is the most important coal field of Ohio in its production and also in its reserves. It includes nearly the whole of Belmont County, the southern third of Jefferson County, the highlands in the southeastern part of Harrison County, and the ridges in the eastern part of Guernsey and Noble counties. To the south the field extends into Monroe County but the coal is under cover, except along the western margin of the county, and hence specific data concerning the coal are lacking. However, the coal is reported in this county by many oil-well drillers and by a few with the diamond drill. Thus in Section 35 of Sunbury Township, 5 feet of the Pittsburgh coal was found; in Section 28, Switzerland Township, 5 feet, 3 inches; and in Section 32, Salem Township, 5 feet, 8 inches. The coal is known in West Virginia along the Ohio River as far south at least as Proctor. It appears, therefore, that the coal is probably present in workable thickness in Monroe County north of a line drawn from Section 24, Malaga Township, through Woodsfield to Proctor on the Ohio River, but lands within this area should not be purchased without first testing with the drill.

Belmont County constitutes the central and by far the most important part of the Belmont field. Erosion has swept away the coal in the northwest corner and it is wanting in a small area in the southwest corner. Elsewhere it appears to be present except in the valley of the Ohio River and in two or three narrow tributary valleys. In the southern two-fifths of the county the Pittsburgh coal has scarcely been touched and it constitutes the largest known block of undeveloped coal in Ohio. The average thickness of the bed, exclusive of partings and of roof coal, in this county, based on measurements in 13 mines, is 4 feet, 10 inches. The maximum reported is 8 feet. Along the western margin the coal measures about 4 feet but drops suddenly to a soot streak.

Jefferson County is north of Belmont and since the coal rises in that direction it lies higher and is confined to ridges and hills. It is therefore accessible and has been worked extensively for 40 years. The thickness of the bed is similar to that of Belmont County. Harrison County has a smaller area of the Pittsburgh coal than has Jefferson or Belmont; moreover, the bed is thinner, seven sections showing an average of 4 feet, 5 inches.

Although the coal in the Belmont field varies from place to place, it is marked by its uniformity in thickness, its regularity in structure, and by its evenness in composition.

In structure the Pittsburgh coal in the Belmont field is similar to that in Pennsylvania and West Virginia, as is shown in many sections on following pages. In places the brick and bottom beds are separated

by a thin shale layer but more commonly this is wanting. Although occasional anticlines or folds are found, the rocks on the whole have a fairly uniform dip. For Belmont County, Stout reports the dip to be south of east at the rate of 20 feet per mile. For Jefferson County, Lamborn places the dip at 17 feet per mile 33° east of south.

The roof of the coal in Belmont County is a weak, clay shale, except in the western part where it is a sandstone. Roof troubles are common and are said to increase the cost of mining from 30 to 50 cents per ton. Farther north, that is in Jefferson and Harrison counties, the roof coal, in places 2 feet thick, is commonly present and is left as a support.

Mud seams (commonly known as clay veins) are rather numerous in Belmont County and are reported to be as much as 20 feet in width. Some entirely replace the coal whereas others cut out the upper part only. Stout thinks the seams were caused by the mud settling into the vegetation before it was consolidated. This crowded the vegetation sidewise and increased its thickness and hence that of the coal along the margins of the seams. Naturally the coal is dirty in such places.

Between the Belmont field and the Federal Creek in Morgan and Athens counties, the Pittsburgh coal is thin and unimportant. It is found near the hilltops in southeast Muskingum County where it is from 18 to 30 inches in thickness. The coal is of even less importance in Noble County except on ridges which form an extension of the Belmont field. Much the same is true in Morgan County east of the Muskingum River where the coal is as much as 30 inches in thickness, but in most places it is only half of that. West of the Muskingum the coal does not appear to be important until the Federal Creek is reached.

Because of its thickness and numerous outcrops, the Pittsburgh coal of the Belmont field must have been known to the earliest settlers. Probably the fuel began to be used for domestic purposes as early as 1825. It is said to have been shipped on the Ohio River in 1835, and this industry became important by 1845, the coal going as far as New Orleans. Bellaire at an early date was a regular coaling station for river boats. The first railroad mine is said to have been opened in 1858 near Bellaire. The Cleveland and Pittsburgh; Cleveland, Lorain, and Wheeling; and Wheeling and Lake Erie railroads gave an outlet to Lake Erie and mining developed at a rapid rate.

Federal Creek Field

The Federal Creek field of the Pittsburgh coal includes parts of Homer and Marion townships in the southwest part of Morgan County and Ames and Bern townships in the northeast part of Athens County. The area is drained by Federal Creek and its tributaries, hence the name of the field.

So far as Morgan County is concerned, the Pittsburgh coal is at its best in Homer Township, but as the bed lies near the summits of ridges and hills, the area is small. In Marion Township, which lies east of Homer, the coal is of value in the southwest corner only and the area probably does not exceed 4 square miles.

The area of workable Pittsburgh coal in Athens County, although larger than in Morgan, is by no means great. In Ames Township the coal lies well up in the ridges and hence the area is small. Bern Township lies east of Ames and because of the dip the coal is lower and the area therefore larger. Along the eastern border of this township the coal is below drainage. To the south in the valley of Federal Creek the coal falls below drainage in Section 18, Rome Township.

The structure of the Pittsburgh coal in the Federal Creek field is in marked contrast with that in the Belmont field where the characteristic structure of the Pennsylvania and West Virginia prevails. Here instead of breast coal, brick coal, etc., we have two benches of coal separated by a persistent layer of clay about 1 foot in thickness. This is shown in sections farther on.

The thickness varies greatly and within short distances, due largely to the thinning or complete absence of the upper bench. In places the upper bench—much less commonly the lower bench—carries boulders of sandstone or of sandstone and pyrite, which of course decrease the value of the coal. The boulders vary greatly in size, some weigh a ton or more while the smallest are the size of pebbles. As to shape, there is much variation. Some are round, some oval, and others flat. Probably they were formed from sand deposited on the vegetation before it was changed to coal.

Railroad connections were provided in 1885 and the coal and coke industries developed fairly rapidly. It is claimed, however, that lack of adequate shipping facilities have been a handicap and was the cause of the abandonment of the coke ovens.

From the Federal Creek field southwest to the Gallia the Pittsburgh coal is of less importance but is mined in a small way by farmers for local use. Thus in the southwest corner of Canaan Township, Athens County, are several ridges and hills in which the coal has a maximum thickness of 6 feet, with the structure characteristic of that in the Federal Creek field. To the east from this deposit the coal thins rapidly and in places is represented by a black streak only. Alexander Township, Athens County, has several patches of the Pittsburgh coal with the two-bench structure though in places only the lower one is present. Lodi Township appears to have more of this coal but drilling is necessary to supply the desired information.

Meigs County lies south of Athens and there conditions with reference to the Pittsburgh coal are similar to those in Athens. In two townships only, Scipio and Bedford, is the coal even of local value.

Bedford Township has a large acreage of this fuel and it is commonly known as the 4-foot bed, though 3-foot would be more appropriate. In places both benches are present but more commonly the lower one only exists. The boulders of sandstone and pyrite are common and of course increase the expense and difficulty of mining. Scipio Township, which lies east of Bedford, has the Pittsburgh coal with a thickness of from 2 to 4 feet in its northern half, but it carries much pyrite and is not largely used by the farmers. Farther south in the county the Pittsburgh coal thins and is of little or no value, and the Pomeroy bed comes into prominence. The following record taken in Section 20, Bedford Township, shows the relative positions of these two beds:[1]

	Ft.	In.
Sandstone.		
Shales	2	0
Coal, *Pomeroy, No. 8a*	1	6
Shales, blue	8	0
Shales, with nodular limestone	11	0
Shaly sandstone	9	0
Coal, *Pittsburgh, No. 8*	2	6

Gallia Field

This is the third field of the Pittsburgh coal in Ohio and it is the least important of the three. It is confined to Gallia County and even there is restricted to five townships. Formerly it was shipped by river to Cincinnati and other places but this was discontinued years ago. The principal mining centers have been the valley of the Ohio River and the valleys of Swan Creek, Big and Little Bull Skin creeks, and that of Yellow Creek. The coal is locally known as the Swan Creek, Lewis, or Jeffers bed. The topography is rough, railroads wanting, and until recently even the highways were very poor. Gallipolis has been a large consumer of the coal, the other market being the farmers near the mines.

The structure and thickness of the Pittsburgh coal resemble those features along Federal Creek in Morgan and Athens counties. The structure shows two benches but the clay or shale parting is not so steady as it is in the former locality. In fact it varies from less than 1 inch to 2 feet.

The coal is patchy and hence uncertain. Thus in Ohio Township the coal has minable thickness along the Ohio Valley near the hamlet of Bladen and nearly due west in the hills flanking Swan Creek, whereas farther south in the township the coal is thin and perhaps wanting. Clay Township lies north of Ohio and there the coal is a little more persistent. However, north of Raccoon Creek the coal is thin, the Pomeroy or 8a bed supplanting it in importance. In Guyan Township

[1]Geological Survey of Ohio, Bull. 9, p. 82.

the Pittsburgh coal is due under a broad area but appears to be present in workable thickness in only the northeast corner. Harrison Township, which lies north of Guyan, probably has the largest deposit of the Pittsburgh coal in the Gallia field. It underlies the two eastern rows of sections but to the west the coal thins rapidly and is unimportant.

The great uses of the Pittsburgh coal of Ohio have always been for general heating and for steam generation. For these purposes it takes high rank, though it is a smoky coal and in coking tends to cut off the draft. It is also a high-grade gas coal though it has not been extensively used in Ohio for this purpose within the last 40 years, owing to an abundant supply of that priceless fuel, natural gas. The coal has been used for coke. A dozen ovens were formerly in operation a few miles west of Bridgeport, Belmont County; a more important location was Utley in Athens County where 125 ovens were built and operated, but they were abandoned about 30 years ago. Here, on account of the expense, slack coal was used. A few miles to the north is Lathrop with 50 ovens but these also have fallen into decay. It is claimed that the coke found a ready market but that the shipping facilities were inadequate. However, it appears to be well established that for metallurgical purposes the Pittsburgh coal of Ohio is too high in sulphur to yield a first-class coke.

Sections and analyses

Sample of Pittsburgh coal taken in 1916 by J. H. Hance from local mine on the property of J. W. Edminston, southwest quarter of Section 16, near New Somerset, five miles south of Yellow Creek, Knox Township, Jefferson County.[1]

		Ft.	In.
Shale, bituminous, and sandstone.			
Shale, coaly.			
Coal, sampled	*Pittsburgh*		4
Clay, sandy, sampled			$\frac{1}{8}$
Coal, sampled			$7\frac{1}{2}$
Clay, sampled			$\frac{1}{8}$
Coal, sampled			$5\frac{1}{8}$
Clay, sampled			$\frac{1}{8}$
Coal, sampled			$3\frac{1}{2}$
Clay, excluded			$\frac{7}{16}$
Coal, sampled			2
Clay, black, sampled			$\frac{1}{4}$
Coal, parting up to $\frac{1}{8}$ inch, sampled			$5\frac{7}{8}$
Clay, bony, excluded			$\frac{1}{4}$
Coal, few irregular partings, sampled		1	$4\frac{3}{4}$

[1]United States Bureau of Mines, Bull. 193, pp. 51, 209–210.

Proximate analysis

	As received	Moisture free
Moisture	3.37	0.00
Volatile matter	37.86	39.17
Fixed carbon	48.78	50.49
Ash	9.99	10.34
	100.00	100.00
Sulphur	3.94	4.08
Air drying loss 1.4 per cent		
Heating value—Calories	7,178	7,429
Heating value—B. t. u.	12,920	13,372

Sample of Pittsburgh coal taken in 1916 by J. H. Hance from Culp's coal bank, two and one-half miles southwest of Empire, southwestern Section 9, Knox Township, Jefferson County.[1]

		Ft.	In.
Sandstone, roof.			
Coal, sampled	*Pittsburgh*		9 1/8
Clay, sandy, sampled			1/4
Coal, few irregular partings, sampled		1	4 7/8
Clay, sampled			3/8
Coal, sampled			2 1/2
Clay, excluded			3/8
Coal, sampled			8 1/4
Clay, sampled			1/4
Coal, sampled			3
Clay, sampled			1/2
Coal, sampled			5 1/2
Clay, excluded			3/16
Shale, bony, excluded			3
Shale, bony, and clay floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.18	0.00
Volatile matter	38.11	39.36
Fixed carbon	49.35	50.97
Ash	9.36	9.67
	100.00	100.00
Sulphur	4.02	4.15
Air drying loss 1.0 per cent		
Heating value—Calories	7,187	7,423
Heating value—B. t. u.	12,937	13,361

[1]United States Bureau of Mines, Bull. 193, pp. 51, 207–208.

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from McFadden mine, operated by Wayne Coal Co., two miles northeast of Hopedale in north central Section 33, Wayne Township, Jefferson County. Analysis by Lord and Somermeier.

		Ft.	In
Coal, roof, reported thickness	*Pittsburgh*		10
Clay shale, draw slate			10
Coal, breast: Coal, sampled		1	2
Shale, sampled			⅛
Coal, sampled			1
Shale, sampled			⅛
Coal, sampled			3
Coal, bearing in, coal and shale sampled			1½
Brick coal, sampled			6
Coal with ½ inch of shale, sampled			2½
Coal, bottom, sampled		1	10
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	5.05	0.00
Volatile matter	35.88	37.79
Fixed carbon	51.12	53.84
Ash	7.95	8.37
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.68	74.44
Hydrogen	5.32	5.01
Oxygen	12.19	8.11
Nitrogen	1.25	1.32
Sulphur	2.61	2.75
Ash	7.95	8.37
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,147	7,527
	B. t. u.	12,865	13,549

Sample of Pittsburgh coal taken in 1912 by D. D. Condit from Parlett mine, of Etta Coal Co., southeast one-fourth of Section 32, Wayne Township, Jefferson County.[1]

Sample taken 2,200 feet north of bottom of slope.

		Ft.	In.
Clay or coal, roof.			
Clay, excluded	*Pittsburgh*	1	2
Coal, sampled		2	5½
Coal, with several shale bands, excluded			3½
Coal, sampled		2	
Clay, floor.			

[1]United States Bureau of Mines, Bull. 85, pp. 62, 248–249.

Proximate analysis

	As received	Moisture free
Moisture	5.01	0.00
Volatile matter	36.15	38.06
Fixed carbon	52.83	55.61
Ash	6.01	6.33
	100.00	100.00
Sulphur	1.74	1.83
Air drying loss 2.2 per cent		
Heating value — Calories	7,327	7,713
Heating value — B. t. u.	13,189	13,883

Sample from above mine, 400 feet northwest of bottom of slope.[1]

		Ft.	In.
Clay or coal, roof.			
Coal, impure, excluded	*Pittsburgh*		11
Clay, excluded			3
Coal, excluded		1	1
Clay, excluded		1	0
Coal, sampled		2	2
Coal, with several shale bands, excluded			3
Coal, sampled		2	3
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.32	0.00
Volatile matter	37.09	38.76
Fixed carbon	49.14	51.36
Ash	9.45	9.88
	100.00	100.00
Sulphur	3.82	3.99
Air drying loss 2.6 per cent		
Heating value — Calories	7,072	7,391
Heating value — B. t. u.	12,730	13,304

Composite of samples taken in above mine 2,200 feet north of bottom of slope and 400 feet northwest of bottom of slope.[2]

[1]Idem.
[2]United States Bureau of Mines, Bull. 85, p. 62.

Proximate analysis

	As received	Moisture free
Moisture	4.70	0.00
Volatile matter	36.60	38.40
Fixed carbon	50.80	53.30
Ash	7.89	8.28
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.72	75.23
Hydrogen	5.28	4.99
Oxygen	10.96	7.14
Nitrogen	1.35	1.42
Sulphur	2.80	2.94
Ash	7.89	8.28
	100.00	100.00

Air drying loss 2.4 per cent

		As received	Moisture free
Heating value	Calories	7,195	7,545
	B. t. u.	12,950	13,580

Sample of Pittsburgh coal taken by W. T. Griswold in 1904, from Scott's bank, one mile north of New Alexandria, west Section 7, Cross Creek Township, Jefferson County.[1]

		Ft.	In.
Coal, sampled			9
Shale, excluded			1
Coal, sampled	*Pittsburgh*		7
Shale, excluded			½
Coal, sampled		2	8½

Proximate analysis

	As received	Moisture free
Moisture	5.19	0.00
Volatile matter	34.69	36.59
Fixed carbon	50.67	53.44
Ash	9.45	9.97
	100.00	100.00
Sulphur	2.38	2.51

Air drying loss 2.8 per cent

Sample of Pittsburgh coal taken in 1904 by W. T. Griswold from Waugh's bank, one mile west of Ohio River near mouth of Georges Run, west central Section 25, Steubenville Township, Jefferson County.[2]

		Ft.	In.
Coal, sampled		2	2½
Shale, excluded			½
Coal, sampled	*Pittsburgh*		2½
Shale, excluded			½
Coal, sampled		2	6

[1]United States Bureau of Mines, Bull. 22, pp. 147, 670; United States Geological Survey, Prof. Paper 48, p. 272.

[2]United States Bureau of Mines, Bull. 22, pp. 147, 669–70.

Proximate analysis

	As received	Moisture free
Moisture	6.55	0.00
Volatile matter	34.48	36.90
Fixed carbon	50.36	53.89
Ash	8.61	9.21
	100.00	100.00
Sulphur	2.52	2.70

Air drying loss 3.8 per cent

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of United States Coal Co., northeast corner of Section 36, Smithfield Township, Jefferson County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, soft, draw slate			9
Coal, breast, sampled	*Pittsburgh*	1	11
Shale, rejected			1
Coal, bearing-in, rejected			1
Shale, rejected			¾
Coal, brick and bottom, sampled		2	2

Clay, unmeasured.

Proximate analysis

	As received	Moisture free
Moisture	4.30	0.00
Volatile matter	35.28	36.87
Fixed carbon	52.54	54.90
Ash	7.88	8.23
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.34	74.55
Hydrogen	5.18	4.91
Oxygen	11.39	7.91
Nitrogen	1.20	1.25
Sulphur	3.01	3.15
Ash	7.88	8.23
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,144	7,465
	B. t. u.	12,859	13,437

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from Crow Hollow mine, operated by United States Coal Co., two miles southeast of Smithfield, northeastern part of Section 3, Smithfield Township, Jefferson County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, bony, not mined	Pittsburgh		1
Coal, breast, sampled		2	1½
Shale, rejected			⅜
Coal, bearing-in, rejected			1⅝
Shale, rejected			1
Coal, brick and bottom, sampled		2	2½
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.96	0.00
Volatile matter	34.51	36.31
Fixed carbon	54.08	56.90
Ash	6.45	6.79
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.43	76.21
Hydrogen	5.37	5.07
Oxygen	12.67	8.69
Nitrogen	1.33	1.40
Sulphur	1.75	1.84
Ash	6.45	6.79
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,277	7,656
	B. t. u.	13,099	13,781

Sample of Pittsburgh coal taken in 1905 by J. W. Groves and W. J. von Borries from Crow Hollow mine of the United States Coal Co., at Bradley, southeast Section 4, Smithfield Township, Jefferson County.[1]

		Ft.	In.
Coal, roof.			
Clay shale, soft, draw slate	Pittsburgh		11
Coal, sampled		1	8
Mother coal, sampled			⅛
Coal, sampled			9
Shale, excluded			3
Coal, sampled		1	2
Pyrite, sampled			¼
Coal, sampled			6
Pyrite, sampled			¼
Coal, sampled			6
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.06	0.00
Volatile matter	38.49	40.12
Fixed carbon	49.70	51.80
Ash	7.75	8.08
	100.00	100.00

[1]United States Geological Survey, Bull. 290, p. 147; Bureau of Mines, Bull. 22, pp. 146, 669.

	As received	Moisture free
Sulphur	3.67	3.82

Air drying loss 1.7 per cent

Heating value	Calories	7,304	7,613
	B. t. u.	13,147	13,703

Sample from above mine, in room 17, off main entry 2, in district 2.[1]

		Ft.	In.
Soapstone, roof.			
Clay shale, excluded		1	4
Coal, sampled	*Pittsburgh*	1	8
Mother coal and pyrite, sampled			1/8
Coal, sampled			8
Shale, excluded			2
Coal, sampled			8
Mother coal, sampled			1/8
Coal, sampled		1	5
Clay floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.20	0.00
Volatile matter	37.16	38.79
Fixed carbon	51.13	53.37
Ash	7.51	7.84
	100.00	100.00
Sulphur	3.22	3.36

Air drying loss 2.0 per cent

Sample of Pittsburgh coal taken in 1913 by D. D. Condit from Piney Fork No. 1 mine, of the Jefferson Coal Co., two miles west of Smithfield, southwest Section 22, Smithfield Township, Jefferson County.[2]

		Ft.	In.
Coal or clay, roof.			
Shale, bony, excluded			2
Coal, sampled		2	7
Clay, excluded			1/8
Coal, excluded			3
Clay, excluded	*Pittsburgh*		1/8
Coal, sampled		1	1
Clay, sampled			1/8
Coal, sampled			5
Coal, high in sulphur, excluded			3
Clay and shale, floor.			

[1]Idem.
[2]United States Bureau of Mines, Bull. 85, pp. 63, 249.

Proximate analysis

	As received	Moisture free
Moisture	4.87	0.00
Volatile matter	36.63	38.51
Fixed carbon	51.25	53.87
Ash	7.25	7.62
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.91	75.59
Hydrogen	5.36	5.07
Oxygen	11.50	7.54
Nitrogen	1.38	1.45
Sulphur	2.60	2.73
Ash	7.25	7.62
	100.00	100.00

Air drying loss 2.8 per cent

		As received	Moisture free
Heating value	Calories	7,218	7,588
	B. t. u.	12,992	13,658

Sample of Pittsburgh coal taken in 1913 by D. D. Condit from Piney Fork No. 2 mine of the Jefferson Coal Co., two miles southwest of Smithfield, northeast Section 22, Smithfield Township, Jefferson County.[1]

		Ft.	In.
Coal or clay, roof.			
Coal, sampled	*Pittsburgh*	2	2½
Clay, excluded			¼
Coal, excluded			3½
Clay, excluded			¼
Coal, sampled		1	8
Coal, high in sulphur, excluded			3
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.47	0.00
Volatile matter	35.77	37.84
Fixed carbon	53.28	56.36
Ash	5.48	5.80
	100.00	100.00
Sulphur	0.77	0.81

Air drying loss 3.2 per cent

		As received	Moisture free
Heating value	Calories	7,324	7,748
	B. t. u.	13,183	13,946

Sample of Pittsburgh coal taken in 1913 by D. D. Condit from Cabbage Run mine of the Jefferson Coal Co., two miles southwest of Smithfield, Section 16, Smithfield Township, Jefferson County.[2]

[1]United States Bureau of Mines, Bull. 85, pp. 63, 249.
[2]United States Bureau of Mines, Bull. 85, pp. 62, 249.

		Ft.	In.
Coal or clay, roof.			
Coal, sampled	*Pittsburgh*	2	3½
Clay, excluded			⅛
Coal, excluded			3½
Clay, excluded			¼
Coal, sampled		1	3
Clay, sampled			⅛
Coal, sampled			6½
Coal, high in sulphur, excluded			3
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.45	0.00
Volatile matter	35.73	37.79
Fixed carbon	54.22	57.35
Ash	4.60	4.86
	100.00	100.00
Sulphur	0.84	0.89
Air drying loss 3.2 per cent		
Heating value, Calories	7,401	7,827
Heating value, B. t. u.	13,322	14,089

Sample of Pittsburgh coal taken in 1913 by D. D. Condit from Goucher No. 2 mine of the Dexter Coal Co., one and one-half miles northwest of Brilliant, southeast quarter of Section 6, Wells Township, Jefferson County.[1]

Sample taken on north side of mine, 500 feet northwest of mouth.

		Ft.	In.
Clay (soapstone), roof.			
Coal, sampled	*Pittsburgh*	2	3
Pyrite, excluded			¼
Coal, excluded			3½
Pyrite, excluded			¼
Coal, sampled		1	3
Pyrite, sampled			⅛
Coal, sampled			11
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.79	0.00
Volatile matter	38.78	40.31
Fixed carbon	50.03	52.00
Ash	7.40	7.69
	100.00	100.00

[1]United States Bureau of Mines, Bull. 85, pp. 62, 248.

	As received	Moisture free
Sulphur	3.84	3.99

Air drying loss 2.0 per cent

Heating value	Calories	7,267	7,553
	B. t. u.	13,081	13,595

Sample from above mine, 500 feet northwest of mine mouth and 1,200 feet from point where first sample was taken.[1]

		Ft.	In.
Clay (soapstone), roof.			
Shale, bony, excluded	*Pittsburgh*		3
Coal, sampled		2	3
Pyrite, excluded			¼
Coal, excluded			3
Pyrite, excluded			¼
Coal, sampled		2	5
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.28	0.00
Volatile matter	37.41	39.08
Fixed carbon	50.29	52.54
Ash	8.02	8.38
	100.00	100.00
Sulphur	3.72	3.89

Air drying loss 2.5 per cent

Heating value	Calories	7,201	7,523
	B. t. u.	12,962	13,541

Composite of samples taken in above mine.[2]

Proximate analysis

	As received	Moisture free
Moisture	4.11	0.00
Volatile matter	37.96	39.59
Fixed carbon	50.23	52.38
Ash	7.70	8.03
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.69	74.77
Hydrogen	5.23	4.97
Oxygen	10.15	6.78
Nitrogen	1.39	1.45
Sulphur	3.84	4.00
Ash	7.70	8.03
	100.00	100.00

Air drying loss 2.3 per cent

[1]Idem.
[2]United States Bureau of Mines, Bull. 85, p. 62.

		As received	Moisture free
Heating value.....	Calories	7,230	7,540
	B. t. u.	13,014	13,572

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Dewland Cox & Sons at Brilliant, northeast quarter of Section 35, Wells Township, Jefferson County. Analysis by Lord and Somermeier.

		Ft.	In.
Breast coal { Coal, sampled.....		1	7
Breast coal { Shale, sampled.....			¼
Breast coal { Coal, sampled.....		1	2
Shale, rejected.....	*Pittsburgh*		2½
Coal, bearing-in, rejected.....			2½
Shale, rejected.....			¾
Coal, brick and bottom, sampled....		2	3½
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture*.....	4.89	0.00
Volatile matter.....	33.10	34.80
Fixed carbon.....	51.55	54.20
Ash.....	10.46	11.00
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon.....	68.01	71.51
Hydrogen.....	5.03	4.72
Oxygen.....	11.29	7.30
Nitrogen.....	1.12	1.17
Sulphur.....	4.09	4.30
Ash.....	10.46	11.00
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value.....	Calories	6,953	7,310
	B. t. u.	12,515	13,158

*Sample slightly wet. Moisture possibly 1 per cent high.

Sample of Pittsburgh coal taken in 1904 by W. T. Griswold from country bank at Brilliant, Wells Township, Jefferson County.[1]

No record of section is available but the thickness and structure of the bed are practically the same as at the Cox mine.

[1]United States Geological Survey, Prof. Paper 48, p. 272; Bureau of Mines, Bull. 22, pp. 147, 669.

Proximate analysis

	As received	Moisture free
Moisture	5.27	0.00
Volatile matter	34.87	36 81
Fixed carbon	49.16	51.90
Ash	10.70	11.29
	100.00	100.00
Sulphur	3.07	3.24

Air drying loss 2.9 per cent

Sample of Pittsburgh coal taken in 1913 by D. D. Condit from Plum Run Mine No. 1 of United States Coal Co., two miles east of Smithfield, west central Section 29, Wells Township, Jefferson County.[1]

		Ft.	In.
Clay, roof.			
Coal, sampled		2	3
Pyrite and clay, excluded			¼
Coal, excluded	*Pittsburgh*		2½
Pyrite and clay, excluded			¼
Coal, sampled		2	3
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.78	0.00
Volatile matter	35.93	37.73
Fixed carbon	53.98	56.69
Ash	5.31	5.58
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	74.13	77.85
Hydrogen	5.35	5.06
Oxygen	12.77	8.95
Nitrogen	1.46	1.53
Sulphur	0.98	1.03
Ash	5.31	5.58
	100.00	100.00

Air drying loss 2.6 per cent

		As received	Moisture free
Heating value	Calories	7,417	7,789
	B. t. u.	13,351	14,020

Sample of Pittsburgh coal taken in 1913 by D. D. Condit from Plum Run mine No. 4 of United States Coal Co., two miles east of Smithfield, central Section 29, Wells Township, Jefferson County.[1]

[1]United States Bureau of Mines, Bull. 85, pp. 63, 249–250.

		Ft.	In.
Clay, roof.			
Coal, sampled	*Pittsburgh*	1	10
Pyrite and clay, excluded			½
Coal, excluded			2¾
Pyrite and clay, excluded			¼
Coal, sampled		2	3
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.52	0.00
Volatile matter	36.40	38.12
Fixed carbon	51.10	53.52
Ash	7.98	8.36
	100.00	100.00
Sulphur	3.33	3.49
Air drying loss 2.6 per cent		
Heating value (Calories)	7,157	7,496
Heating value (B. t. u.)	12,883	13,493

Sample of Pittsburgh coal taken in 1913 by D. D. Condit from Plum Run mine No. 5 of United States Coal Co., two miles east of Smithfield, south central Section 29, Wells Township, Jefferson County.[1]

		Ft.	In.
Clay, roof.			
Coal, sampled	*Pittsburgh*	2	1
Pyrite and clay, excluded			¼
Coal, excluded			2½
Pyrite and clay, excluded			¼
Coal, sampled		2	2½
Clay and shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.26	0.00
Volatile matter	36.61	38.24
Fixed carbon	52.18	54.50
Ash	6.95	7.26
	100.00	100.00
Sulphur	2.57	2.68
Air drying loss 2.3 per cent		
Heating value (Calories)	7,307	7,632
Heating value (B. t. u.)	13,153	13,738

[1]United States Bureau of Mines, Bull. 85, pp. 63, 249–250.

Sample of Pittsburgh coal taken in 1905 by J. W. Groves from Rush Run No. 1 mine of the Glens Run Coal Co., at Rush Run, Section 8, Warren Township, Jefferson County.[1]

Measured 2,400 feet southeast of drift mouth.

		Ft.	In.
Coal, roof.			
Coal, sampled	*Pittsburgh*	1	3
Pyrite, sampled			1/8
Coal, sampled			11
Shale and coal, excluded			3
Shale, excluded			1/4
Coal, sampled		1	2
Shale, sampled			1/8
Coal, sampled			11
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.69	0.00
Volatile matter	35.57	37.32
Fixed carbon	53.73	56.37
Ash	6.01	6.31
	100.00	100.00
Sulphur	1.54	1.62
Air drying loss 2.4 per cent		
Heating value—Calories	7,403	7,767
Heating value—B. t. u.	13,325	13,981

Measured in same mine, 2,600 feet south of drift mouth.[1]

		Ft.	In.
Coal, roof.			
Coal, sampled	*Pittsburgh*	1	4
Mother coal, sampled			1/4
Coal, sampled			9
Shale, excluded			2
Coal, sampled			2
Pyrite, excluded			1
Coal, sampled			11
Shale, sampled			1/8
Coal, sampled		1	0
Shale, floor.			

[1]United States Geological Survey, Bull. 290, p. 151; United States Bureau of Mines, Bull. 22, pp. 147, 670–671.

Proximate analysis

	As received	Moisture free
Moisture	4.99	0.00
Volatile matter	35.33	37.18
Fixed carbon	53.98	56.82
Ash	5.70	6.00
	100.00	100.00
Sulphur	0.95	1.00

Air drying loss 2.2 per cent

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Glens Run Coal Co., east central Section 36, Warren Township, Jefferson County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, breast, sampled	*Pittsburgh*	2	4
Shale, rejected			$\frac{5}{8}$
Coal, bearing-in, rejected			1
Shale, rejected			$\frac{5}{8}$
Coal, brick and bottom, sampled		2	1
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.57	0.00
Volatile matter	32.40	33.95
Fixed carbon	54.03	56.62
Ash	9.00	9.43
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.18	74.59
Hydrogen	5.06	4.77
Oxygen	11.89	8.21
Nitrogen	1.32	1.38
Sulphur	1.55	1.62
Ash	9.00	9.43
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,105	7,445
	B. t. u.	12,789	13,401

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Ohio and Pennsylvania Coal Co., near Yorkville, southern Section 22, Warren Township, Jefferson County. Analysis by Lord and Somermeier.

		Ft.	In.
Breast coal, sampled	*Pittsburgh*	2	7
Shale, rejected			$\frac{1}{2}$
Coal, bearing-in, rejected			$1\frac{1}{4}$
Shale, rejected			$\frac{1}{2}$
Coal, brick and bottom, sampled		2	$5\frac{1}{2}$
Clay, unmeasured			

Proximate analysis

	As received	Moisture free
Moisture	3.13	0.00
Volatile matter	37.88	39.10
Fixed carbon	50.77	52.41
Ash	8.22	8.49
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.03	73.32
Hydrogen	5.38	5.19
Oxygen	10.09	7.55
Nitrogen	1.26	1.30
Sulphur	4.02	4.15
Ash	8.22	8.49
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,233	7,466
	B. t. u.	13,019	13,439

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from Dillon No. 2 mine, operated by Wheeling and Lake Erie Coal Mining Co., at Dillonvale, northeast Section 6, Mt. Pleasant Township, Jefferson County. Analysis by Lord and Somermeier.

		Ft.	In.
Limestone, unmeasured.			
Clay, with some limestone		3	0
Shales			2
Coal, roof: Coal, rejected			2½
Coal, roof: Shales, rejected			1½
Coal, roof: Coal, rejected		1	6
Coal, roof: Shales, rejected			¾
Coal, roof: Coal, rejected			1½
Clay shale, soft, rejected		1	0
Coal, breast, sampled	*Pittsburgh*	2	6½
Shale, rejected			⅝
Coal, bearing-in: Coal, rejected			1⅝
Coal, bearing-in: Shale, rejected			⅝
Coal, bearing-in: Coal, rejected			2¼
Shale, rejected			⅜
Coal, brick and bottom, sampled		2	8
Clay, reported thickness			7

Proximate analysis

	As received	Moisture free
Moisture	3.10	0.00
Volatile matter	37.92	39.13
Fixed carbon	49.46	51.04
Ash	9.52	9.83
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.56	71.78
Hydrogen	5.22	5.04
Oxygen	10.77	8.27
Nitrogen	1.10	1.13
Sulphur	3.83	3.95
Ash	9.52	9.83
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,153	7,382
	B. t. u.	12,875	13,287

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Glover Coal Co., near Cadiz, southwest quarter of Section 5, Cadiz Township, Harrison County. Analysis by Lord and Somermeier.

		Ft.	In.
Shales, unmeasured.			
Coal, breast. Coal, sampled	*Pittsburgh*		7
Coal, breast. Pyrite layer, often wanting, sampled	*Pittsburgh*		3/8
Coal, breast. Coal, sampled	*Pittsburgh*	1	6
Coal, bearing-in, with two thin partings, rejected	*Pittsburgh*		2
Coal, brick, sampled	*Pittsburgh*	1	3
Shale, sampled	*Pittsburgh*		1/4
Coal, bottom, sampled	*Pittsburgh*	1	1
Clay, reported thickness			6

Proximate analysis

	As received	Moisture free
Moisture	3.83	0.00
Volatile matter	36.70	38.16
Fixed carbon	48.59	50.53
Ash	10.88	11.31
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.70	70.40
Hydrogen	5.09	4.85
Oxygen	10.68	7.57
Nitrogen	1.27	1.32
Sulphur	4.38	4.55
Ash	10.88	11.31
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,864	7,137
	B t. u.	12,355	12,847

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from John Edwards farm, northeast quarter of Section 1, Athens Township, Harrison County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, roof			10
Clay shale, soft	*Pittsburgh*		10
Coal, breast, sampled	*Pittsburgh*	2	0
Coal, bearing-in, (coal and shale), rejected	*Pittsburgh*		2
Coal, brick, sampled	*Pittsburgh*	1	3
Shale, sampled	*Pittsburgh*		1/4
Coal, bottom, sampled	*Pittsburgh*	1	1/2
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	5.98	0.00
Volatile matter	34.35	36.53
Fixed carbon	53.70	57.12
Ash	5.97	6.35
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.22	76.81
Hydrogen	5.44	5.08
Oxygen	13.71	8.93
Nitrogen	1.31	1.39
Sulphur	1.35	1.44
Ash	5.97	6.35
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,202	7,660
	B. t. u.	12,964	13,788

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Adena Mining Co., northeast quarter of Section 2, Short Creek Township, Harrison County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, roof: Coal, rejected		1	0
Parting, rejected			¼
Coal, rejected			½
Parting, rejected			¼
Coal, rejected			¼
Clay, draw slate, rejected			10
Coal, bony, not mined	*Pittsburgh*		1½
Coal, breast, sampled		2	5½
Shale, rejected			½
Coal, bearing-in, rejected			2
Shale, rejected			½
Coal, brick, sampled		1	½
Pyrite layer, rejected			1¼
Coal, bottom, sampled			11½
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.18	0.00
Volatile matter	36.95	38.56
Fixed carbon	50.65	52.86
Ash	8.22	8.58
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.20	74.31
Hydrogen	5.36	5.11
Oxygen	11.13	7.74
Nitrogen	1.26	1.31
Sulphur	2.83	2.95
Ash	8.22	8.58
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,160	7,472
	B. t. u.	12,888	13,450

Sample of Pittsburgh coal taken by B. A. Eisenlohr in 1907 from S. P. Dunlap farm, near Science Hill, southwest quarter of Section 26, Short Creek Township, Harrison County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, roof, reported		2	0
Clay shale, reported		1	2
Coal, breast, sampled		2	1
Shale, sampled	*Pittsburgh*		½
Coal, bearing-in, sampled			2½
Shale, sampled			¾
Coal, brick and bottom, sampled		1	10½

Proximate analysis

	As received	Moisture free
Moisture	6.54	0.00
Volatile matter	35.48	37.96
Fixed carbon	51.24	54.83
Ash	6.74	7.21
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.49	75.42
Hydrogen	5.70	5.32
Oxygen	13.66	8.40
Nitrogen	1.22	1.31
Sulphur	2.19	2.34
Ash	6.74	7.21
	100.00	100.00

		As received	Moisture free
Heating value	Calories	7,061	7,555
	B. t. u.	12,710	13,599

Sample of Pittsburgh coal taken in 1920 by P. D. Browning from Laughlin mine of American Sheet and Tin Plate Co., near Martins Ferry, southeast Section 24, Pease Township, Belmont County.[1]

Measured at right rib, 50 feet from face of main haulage entry.

		Ft.	In.
Clay shale, excluded			9
Coal, sampled		2	6
Coal, bony, sampled			¼
Coal, sampled			2½
Shale, sampled	*Pittsburgh*		¼
Coal, sampled			6
Shale, excluded			½
Coal, sampled		2	0

[1]United States Bureau of Mines, Technical Paper 344, pp. 13, 33.

Proximate analysis

	As received	Moisture free
Moisture	4.0	0.0
Volatile matter	39.6	41.3
Fixed carbon	48.3	50.3
Ash	8.1	8.4
	100.0	100.0
Sulphur	3.4	3.5
Heating value { Calories	7,222	7,523
Heating value { B. t. u.	13,000	13,541

Air drying loss 2.7 per cent

Softening temperature of ash, 2,040°F.

Sample from above mine measured at last crosscut, 17 and 18 right butts, 23 south entry.[1]

		Ft.	In.
Draw slate, excluded		1	0
Coal, sampled		2	5
Bone, sampled			$\frac{1}{8}$
Coal, sampled			2
Shale, excluded			1
Coal, sampled	*Pittsburgh*		$5\frac{1}{2}$
Mother coal, sampled			$\frac{1}{4}$
Coal, sampled			$9\frac{1}{2}$
Mother coal, sampled			$\frac{1}{4}$
Coal, sampled		1	2

Proximate analysis

	As received	Moisture free
Moisture	3.9	0.0
Volatile matter	38.9	40.5
Fixed carbon	48.0	49.9
Ash	9.2	9.6
	100.0	100.0
Sulphur	3.6	3.7
Heating value { Calories	7,144	7,434
Heating value { B. t. u.	12,860	13,381

Air drying loss 2.4 per cent

Softening temperature of ash, 2,040°F.

Sample taken from above mine, at left rib, 50 feet from face of 23 south entry.[1]

[1]Idem.

		Ft.	In.
Clay shale, draw slate, excluded		1	3
Coal, sampled	*Pittsburgh*	2	2½
Shale, excluded			1
Coal, sampled			2½
Shale, excluded			¾
Coal, sampled			9½
Mother coal, sampled			¼
Coal, sampled		1	7½

Proximate analysis

	As received	Moisture free
Moisture	3.9	0.0
Volatile matter	38.7	40.3
Fixed carbon	49.3	51.3
Ash	8.1	8.4
	100.0	100.0
Sulphur	3.3	3.4
Heating value — Calories	7,244	7,538
Heating value — B. t. u.	13,040	13,569

Air drying loss 2.6 per cent

Softening temperature of ash, 2,040°F.

Composite of the three samples taken from above mine.[1]

Proximate analysis

	As received	Moisture free
Moisture	3.9	0.0
Volatile matter	39.6	41.2
Fixed carbon	48.0	49.9
Ash	8.5	8.9
	100.0	100.0

Ultimate analysis

	As received	Moisture free
Carbon	71.2	74.1
Hydrogen	5.3	5.0
Oxygen	10.3	7.0
Nitrogen	1.3	1.4
Sulphur	3.4	3.6
Ash	8.5	8.9
	100.0	100.0

Air drying loss 2.6 per cent

	As received	Moisture free
Heating value — Calories	7,200	7,492
Heating value — B. t. u.	12,960	13,486

Sample of Pittsburgh coal taken in 1907 from mine which supplies Aetna Standard Mill of American Sheet & Tin Plate Co., at north end of Bridgeport, northeast Section 28, Pease Township, Belmont County. Analysis by Lord and Somermeier.

[1]Idem.

		Ft.	In.
Coal, breast, sampled	*Pittsburgh*	2	½
Shale, rejected			⅝
Coal, bearing-in, rejected			2⅞
Shale, rejected			¼
Coal, brick and bottom, sampled		2	7½
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	3.39	0.00
Volatile matter	36.84	38.13
Fixed carbon	51.91	53.73
Ash	7.86	8.14
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.45	73.95
Hydrogen	5.21	5.01
Oxygen	11.27	8.55
Nitrogen	1.24	1.28
Sulphur	2.97	3.07
Ash	7.86	8.14
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,217	7,470
	B. t. u.	12,991	13,446

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of the Youghiogheny and Ohio Coal Co., at Barton, central Section 24, Colerain Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, breast: Coal, sampled	*Pittsburgh*	2	8½
Bone coal, sampled			¾
Coal, sampled			5
Parting, rejected			⅜
Coal, bearing-in, rejected			2½
Parting, rejected			¾
Coal, brick, sampled			8
Parting, sampled			⅜
Coal, bottom, sampled		1	2

Proximate analysis

	As received	Moisture free
Moisture	3.79	0.00
Volatile matter	36.37	37.80
Fixed carbon	50.84	52.84
Ash	9.00	9.36
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.41	73.18
Hydrogen	5.14	4.91
Oxygen	10.20	7.10
Nitrogen	1.09	1.13
Sulphur	4.16	4.32
Ash	9.00	9.36
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,145	7,426
	B. t. u.	12,861	13,367

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Columbian Coal Co., at Fairpoint, southwest Section 13, Wheeling Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, draw slate.			
Coal, breast: Coal, sampled		1	½
Coal, breast: Smut rock, sampled			⅜
Coal, breast: Coal, sampled			8½
Smut coal, sampled			⅛
Coal, bearing-in, sampled			5¼
Smut coal, sampled	*Pittsburgh*		⅛
Coal, brick and bottom: Coal, sampled			1½
Coal, brick and bottom: Shale, sampled			½
Coal, brick and bottom: Coal, sampled		2	2
Coal, brick and bottom: Shale, sampled			¼
Coal, brick and bottom: Coal, sampled			6½
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.25	0.00
Volatile matter	33.53	35.02
Fixed carbon	51.87	54.17
Ash	10.35	10.81
	100.00	100.00

*Ultimate analysis**

	As received	Moisture free
Carbon	68.17	71.19
Hydrogen	5.19	4.93
Oxygen	11.25	7.80
Nitrogen	1.09	1.14
Sulphur	3.95	4.13
Ash	10.35	10.81
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories*	6,903	7,209
	B. t. u.	12,425	12,976

*Ultimate and calorific tests made several weeks after preparation of sample. Calories probably 100 higher.

Sample of Pittsburgh coal taken in 1906 by J. W. Groves and K. M. Way from Black Oak mine of the Kennon Coal and Mining Co., two miles southeast of Flushing, southwest corner of Section 7, Wheeling Township, Belmont County.[1]

Measured 2,000 feet west of shaft.

[1]United States Geological Survey, Bull. 332, p. 189; United States Bureau of Mines, Bull. 22, pp. 145, 664.

		Ft.	In.
Coal, roof.			
Coal, excluded			2
Shale, excluded			2
Coal, sampled		1	4
Shale, excluded			1½
Coal, excluded	*Pittsburgh*		2½
Shale, excluded			½
Coal, sampled		1	6
Shale, sampled			¼
Coal, sampled		1	2
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.96	0.00
Volatile matter	38.09	39.65
Fixed carbon	48.91	50.94
Ash	9.04	9.41
	100.00	100.00
Sulphur	4.25	4.43

Air drying loss 1.7 per cent

Sample measured in above mine 1,500 feet southwest of shaft.[1]

		Ft.	In.
Coal, roof.			
Coal, sampled		1	11
Shale, excluded			¾
Coal, sampled		1	3
Mother coal, sampled	*Pittsburgh*		¼
Coal, sampled			8
Shale, excluded			1
Coal, sampled		1	1
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.13	0.00
Volatile matter	39.22	40.91
Fixed carbon	48.69	50.79
Ash	7.96	8.30
	100.00	100.00
Sulphur	4.15	4.30

Air drying loss 1.9 per cent

Heating value	Calories	7,271	7,584
	B. t. u.	13,088	13,651

[1]Idem.

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Kennon Coal and Mining Co., near Flushing, south central Section 26, Flushing Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, soft			10
Coal, bony, rejected	*Pittsburgh*		2½
Coal, breast, sampled		1	7
Shale, sampled			¼
Coal, bearing-in, sampled			2
Shale, sampled			¼
Coal, brick and bottom, sampled		2	5

Proximate analysis

	As received	Moisture free
Moisture	4.23	0.00
Volatile matter	36.34	37.94
Fixed carbon	50.22	52.44
Ash	9.21	9.62
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.75	71.78
Hydrogen	5.14	4.88
Oxygen	11.64	8.23
Nitrogen	1.09	1.14
Sulphur	4.17	4.35
Ash	9.21	9.62
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,003	7,312
	B. t. u.	12,605	13,162

Sample of Pittsburgh coal taken in 1923 by J. N. Staud from Rosemary No. 1 mine of the Rosemary Coal Co., near Flushing, south central Section 26, Flushing Township, Belmont County. Analysis by United States Bureau of Mines.[1]

Proximate analysis

		As received	Moisture free
Moisture		1.9	0.0
Volatile matter		39.2	39.9
Fixed carbon		49.5	50.5
Ash		9.4	9.6
		100.0	100.0
Sulphur		4.7	4.8
Heating value	Calories	7,194	7,328
	B. t. u.	12,950	13,190

[1]Unpublished.

Sample of Pittsburgh coal taken in 1907 by J. E. Hyde from bank of F. W. McCartney, one-half mile west of Hendrysburg, northeast quarter of Section 20, Kirkwood Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, roof, reported	*Pittsburgh*	1	0
Clay shale, reported			6
Coal, impure, excluded			3
Coal, breast, with numerous pyrite and shale lenses, sampled		1	2½
Shale and pyrite, excluded			1
Coal, brick and bottom, sampled		2	11

Proximate analysis

	As received	Moisture free
Moisture	3.75	0.00
Volatile matter	37.99	39.47
Fixed carbon	47.42	49.27
Ash	10.84	11.26
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.41	70.04
Hydrogen	5.09	4.85
Oxygen	10.79	7.75
Nitrogen	1.11	1.15
Sulphur	4.76	4.95
Ash	10.84	11.26
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,865	7,132
	B. t. u.	12,357	12,838

Sample of Pittsburgh coal taken in 1927 by G. W. White and P. E. Fitzgerald from mine of L. H. Barr, southwest Section 25, Union Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, hard.			
Coal, good, sampled	*Pittsburgh*		6½
Coal, bony, rejected			3
Coal, good, sampled		1	1
Shale, dark, rejected			⅝
Coal, good, sampled			5
Shale, variable, mined, sampled			⅜
Coal, good, sampled			4½
Shale, variable, mined, sampled			⅜
Coal, good, sampled		1	10¾
Coal, bony, rejected			6

Proximate analysis

	As received	Moisture free
Moisture	4.22	0.00
Volatile matter	41.86	43.70
Fixed carbon	44.00	45.94
Ash	9.92	10.36
	100.00	100.00

		As received	Moisture free
Sulphur		4.56	4.76
Air drying loss 1.85 per cent			
Heating value	Calories	6,973	7,280
	B. t. u.	12,551	13,104
Fusion of ash	Incipient	1,994°F.	
	Complete	2,107°F.	

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Wheeling Valley Coal Co., at Laferty, southwest Section 6, Union Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, draw slate, excluded		1	0
Coal, impure, excluded	*Pittsburgh*		2
Coal, breast, sampled		1	9
Shale, excluded			¾
Coal, bearing-in, excluded			2
Shale, excluded			¼
Coal, brick, sampled		1	8½
Shale, sampled			⅜
Coal, bottom, sampled		1	2
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.46	0.00
Volatile matter	36.00	37.68
Fixed carbon	48.78	51.06
Ash	10.76	11.26
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.24	71.42
Hydrogen	4.85	4.56
Oxygen	10.60	6.95
Nitrogen	1.10	1.15
Sulphur	4.45	4.66
Ash	10.76	11.26
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,903	7,225
	B. t. u.	12,425	13,005

Sample of Pittsburgh coal taken in 1907 by J. E. Hyde from Neff mine No. 2 of the Pittsburgh-Belmont Coal Co., central Section 13, Pultney Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, excluded			10
Coal, bony, marketed, sampled	*Pittsburgh*		1½
Coal, breast, contains four pyrite streaks, sampled		2	1½
Shale, sampled			¼
Coal, including a pyrite band near middle, sampled			2¾
Shale, excluded			1
Coal, brick, including two thin pyrite lenses, sampled		1	5
Pyrite, excluded			1½
Coal, bottom		1	3

Proximate analysis

	As received	Moisture free
Moisture	3.80	0.00
Volatile matter	37.18	38.65
Fixed carbon	50.07	52.05
Ash	8.95	9.30
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	70.57	73.36
Hydrogen	5.23	5.00
Oxygen	9.78	6.65
Nitrogen	1.20	1.25
Sulphur	4.27	4.44
Ash	8.95	9.30
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,103	7,383
	B. t. u.	12,785	13,289

Sample of Pittsburgh coal taken in 1905 by J. W. Groves and W. J. von Borries from Neff mine No. 1 of the Neff Coal Mining Co., at Neffs, northwest quarter of Section 12, Pultney Township, Belmont County.[1]

Measured 2,000 feet southeast of drift mouth.

		Ft.	In.
Coal, roof, excluded.			
Clay shale, excluded	*Pittsburgh*		10
Coal, sampled		1	2
Shale, sampled			⅛
Coal, sampled			9
Pyrite, sampled			⅛
Coal, sampled			4
Shale, sampled			¼
Coal, sampled		1	5½
Pyrite, excluded			1½
Coal, sampled		1	3
Shale, floor.			

[1]United States Geological Survey, Bull. 290, p. 154; United States Bureau of Mines, Bull. 22, pp. 145, 665.

Proximate analysis

	As received	Moisture free
Moisture	3.99	0.00
Volatile matter	38.77	40.38
Fixed carbon	49.17	51.22
Ash	8.07	8.40
	100.00	100.00
Sulphur	3.49	3.64
Air drying loss 1.8 per cent		
Heating value: Calories	7,279	7,582
Heating value: B. t. u.	13,102	13,648

Sample from above mine 1,000 feet southwest of drift mouth.[1]

		Ft.	In.
Clay shale, roof.			
Coal, sampled	*Pittsburgh*	1	11
Pyrite and mother coal, sampled			1/8
Coal, sampled			5
Shale, sampled			1/2
Coal, sampled		1	3
Mother coal, sampled			1/8
Coal, sampled			10
Pyrite, excluded			1
Coal, sampled		1	3
Coal, bony, excluded			5
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.06	0.00
Volatile matter	39.45	41.12
Fixed carbon	50.05	52.17
Ash	6.44	6.71
	100.00	100.00
Sulphur	3.35	3.49

Air drying loss 1.8 per cent

Sample of Pittsburgh coal taken in 1907 by J. E. Hyde from mine of Empire Coal Mining Co., one mile south of Bellaire, southeast quarter of Section 28, Pultney Township, Belmont County. Analysis by Lord and Somermeier.

[1]Idem.

		Ft.	In.
Clay shale, excluded		1	0
Coal, breast, sampled	*Pittsburgh*	2	1
Pyrite, excluded			$\frac{5}{8}$
Coal, bearing-in, sampled			3
Shale and pyrite, excluded			$\frac{1}{2}$
Coal, brick, containing six very thin shale partings, sampled		1	5
Shale and pyrite, excluded			1
Coal, bottom, sampled			10
Shale, excluded.			

Proximate analysis

	As received	Moisture free
Moisture	3.51	0.00
Volatile matter	38.65	40.06
Fixed carbon	50.98	52.83
Ash	6.86	7.11
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.06	74.68
Hydrogen	5.45	5.24
Oxygen	10.70	7.86
Nitrogen	1.17	1.21
Sulphur	3.76	3.90
Ash	6.86	7.11
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,325	7,591
	B. t. u.	13,185	13,664

Sample of Pittsburgh coal taken in 1906 by J. W. Groves and K. M. Way from the Empire mine No. 1 of the Empire Coal Mining Co., southeast quarter of Section 28, Pultney Township, Belmont County.[1]

Measured in room 3, off west entry 4.

		Ft.	In.
Coal, sampled	*Pittsburgh*	2	4
Shale, excluded			$\frac{3}{4}$
Coal, sampled			$9\frac{3}{4}$
Sandstone, excluded			$\frac{3}{4}$
Coal, sampled			$8\frac{1}{2}$
Shale, excluded			1
Coal, sampled		1	2
Coal (bottom), excluded			4
Shale, floor.			

[1]United States Geological Survey, Bull. 332, p. 191; United States Bureau of Mines, Bull. 22, pp. 144, 663.

Proximate analysis

	As received	Moisture free
Moisture	3.32	0.00
Volatile matter	40.80	42.20
Fixed carbon	49.11	50.80
Ash	6.77	7.00
	100.00	100.00
Sulphur	3.55	3.67

Air drying loss 1.2 per cent

Sample from above mine measured in room 24, off entry 10.[1]

		Ft.	In.
Coal and slate, roof.			
Coal, sampled	*Pittsburgh*	2	7
Shale, excluded			½
Coal, sampled		1	4½
Shale, excluded			1
Coal, sampled			11
Coal, bottom, excluded			4½
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.10	0.00
Volatile matter	40.76	42.06
Fixed carbon	50.11	51.72
Ash	6.03	6.22
	100.00	100.00
Sulphur	3.42	3.53

Air drying loss 1.1 per cent

Heating value	Calories	7,553	7,795
	B. t. u.	13,595	14,031

Sample of Pittsburgh coal taken in 1907 by J. E. Hyde from Delora No. 1 mine, operated by Highland Coal Co., one-fourth mile west of Glencoe, northeast Section 5, Smith Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, draw slate			10
Coal, breast, with one pyrite band, sampled	*Pittsburgh*	1	11
Pyrite, rejected			1
Coal, bearing-in, rejected			3
Pyrite, rejected			1
Coal, sampled		2	4
Coal, brick and bottom — Pyrite, sampled			⅛
Coal, brick and bottom — Coal, sampled			4
Coal, brick and bottom — Pyrite, rejected			⅛
Coal, brick and bottom — Coal, rejected			3½

[1]Idem.

Proximate analysis

	As received	Moisture free
Moisture	3.21	0.00
Volatile matter	36.82	38.04
Fixed carbon	52.71	54.46
Ash	7.26	7.50
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	71.49	73.86
Hydrogen	5.14	4.95
Oxygen	10.77	8.18
Nitrogen	1.06	1.09
Sulphur	4.28	4.42
Ash	7.26	7.50
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,297	7,539
	B. t. u.	13,135	13,570

Sample of Pittsburgh coal taken in 1927 by G. W. White and P. E. Fitzgerald from Loomis mine, operated by National Coal Co., of Cleveland, northwest quarter of Section 36, Smith Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray.			
Coal, roof, rejected		1	0
Shale, gray, hard, rejected		1	0
Coal, bony, rejected			2½
Coal, good, sampled		1	8
Shale, dark, bony, rejected			½
Coal, good, sampled	*Pittsburgh*		1½
Coal, bony, shaly bands, rejected			2½
Coal, good, sampled		1	8
Pyrite, variable, sampled			⅛
Coal, good, sampled			7½
Coal, bony, rejected			6

Proximate analysis

	As received	Moisture free
Moisture	6.00	0.00
Volatile matter	41.19	43.82
Fixed carbon	43.99	46.80
Ash	8.82	9.38
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.02	73.42
Hydrogen	5.76	5.42
Oxygen	10.92	5.95
Nitrogen	1.16	1.23
Sulphur	4.32	4.60
Ash	8.82	9.38
	100.00	100.00

Air drying loss 3.7 per cent

		As received	Moisture free
Heating value	Calories	6,990	7,436
	B. t. u.	12,583	13,386

Fusion of ash	Incipient	1,994°F.
	Complete	2,107°F.

Sample of Pittsburgh coal taken in 1907 by J. E. Hyde from Media mine, operated by the Colburg Coal Co., northeast quarter of Section 31, Warren Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, draw slate, rejected			6
Shale, black, rejected			1¾
Coal, impure, rejected	Pittsburgh		2¾
Coal, breast, sampled			11
Shale, rejected			1
Coal, bearing-in, impure, sampled			5
Shale, sampled			¼
Coal, brick and bottom, sampled		3	0

Proximate analysis

	As received	Moisture free
Moisture	4.47	0.00
Volatile matter	37.53	39.29
Fixed carbon	46.99	49.19
Ash	11.01	11.52
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.64	70.80
Hydrogen	5.17	4.90
Oxygen	10.43	6.76
Nitrogen	1.08	1.13
Sulphur	4.67	4.89
Ash	11.01	11.52
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,875	7,196
	B. t. u.	12,375	12,953

Sample of Pittsburgh coal taken in 1914 by R. V. A. Mills from Cochran mine No. 2, located at Baileys Mills, southwest quarter of Section 31, Warren Township, Belmont County, and operated by Bixler Ohio Coal Co.[1]

Measured at face of main north entry, 1 mile north of mine mouth.

		Ft.	In.
Shale, roof.			
Coal, sampled	Pittsburgh		9
Pyrite, excluded			1
Coal, sampled		2	11
Clay, floor.			

[1]United States Geological Survey, Bull. 621, pp. 262, 332.

Proximate analysis

	As received	Moisture free
Moisture	4.13	0.00
Volatile matter	42.71	44.55
Fixed carbon	43.83	45.72
Ash	9.33	9.73
	100.00	100.00
Sulphur	4.46	4.65
Air drying loss 2.3 per cent		
Heating value—Calories	7,074	7,379
Heating value—B. t. u.	12,733	13,282

Sample from above mine measured in room 6, 15 west entry, three-fourths mile north of mine mouth.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled	*Pittsburgh*	1	1
Pyrite, excluded			1
Coal, with some sulphur, sampled			2
Coal, sampled			3
Coal, bony, sampled			1
Coal, sampled			6
Pyrite, sampled			¼
Coal, sampled		2	0
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.72	0.00
Volatile matter	43.25	44.92
Fixed carbon	44.40	46.12
Ash	8.63	8.96
	100.00	100.00
Sulphur	4.45	4.62
Air drying loss 1.7 per cent		
Heating value—Calories	7,193	7,471
Heating value—B. t. u.	12,947	13,447

Mixture of samples from above mine.[2]

[1]Idem.

[2]United States Geological Survey, Bull. 621, p. 332.

Proximate analysis

	As received	Moisture free
Moisture	3.88	0.00
Volatile matter	43.09	44.83
Fixed carbon	43.96	45.73
Ash	9.07	9.44
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.97	72.80
Hydrogen	5.46	5.23
Oxygen	9.87	6.67
Nitrogen	1.27	1.32
Sulphur	4.36	4.54
Ash	9.07	9.44
	100.00	100.00

Air drying loss 2.0 per cent

		As received	Moisture free
Heating value	Calories	7,137	7,420
	B. t. u.	12,838	13,356

Sample of Pittsburgh coal taken in 1907 by J. E. Hyde from mine of Johnson Brothers, southeast quarter of Section 6, Mead Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In
Clay shale, draw slate, rejected		1	4
Coal, breast, sampled	*Pittsburgh*	2	3
Shale, rejected			½
Coal, bearing-in, sampled			4½
Shale, rejected			½
Coal, brick and bottom, sampled		3	2

Proximate analysis

	As received	Moisture free
Moisture	2.91	0.00
Volatile matter	37.94	39.08
Fixed carbon	51.15	52.68
Ash	8.00	8.24
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	72.95	75.13
Hydrogen	5.11	4.93
Oxygen	8.59	6.19
Nitrogen	1.04	1.07
Sulphur	4.31	4.44
Ash	8.00	8.24
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,340	7,560
	B. t. u.	13,212	13,608

Sample of Pittsburgh coal taken in 1927 by G. W. White and P. E. Fitzgerald from Powhatan mine, operated by Cleveland and Western Coal Co., Cleveland, northeast quarter of Section 7, York Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Coal, shaly.			
Shale, bony			2
Coal, bony, rejected			2
Coal, good, sampled		1	10
Shale, hard, rejected			1
Coal, good, sampled			8
Shale, hard, rejected	*Pittsburgh*		¾
Coal, good, sampled		1	0
Pyrite, rejected			½
Coal, good, sampled			10½
Shale, with pyrite, rejected			¼
Coal, good, sampled			10
Coal, left for floor, not sampled			3

Proximate analysis

	As received	Moisture free
Moisture	2.26	0.00
Volatile matter	42.63	43.62
Fixed carbon	48.43	49.55
Ash	6.68	6.83
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	74.24	75.95
Hydrogen	5.20	5.06
Oxygen	9.30	7.47
Nitrogen	1.40	1.43
Sulphur	3.18	3.26
Ash	6.68	6.83
	100.00	100.00

Air drying loss 0.0 per cent

		As received	Moisture free
Heating value	Calories	7,456	7,628
	B. t. u.	13,421	13,731

Fusion of ash: Incipient 2,500°F.; Complete 2,554°F.

Sample of Pittsburgh coal taken in 1927 by G. W. White and P. E. Fitzgerald from mine of D. E. McIntyre, southeast quarter of Section 21, York Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Coal, shaly.			
Shale, gray, hard		1	5
Coal, bony, rejected			1½
Coal, good, sampled		1	7
Shale, dark, hard, rejected			⅜
Coal, good, sampled			6½
Shale, dark, hard, rejected	*Pittsburgh*		⅜
Coal, good, sampled		1	5
Pyrite, rejected			⅜
Coal, good, sampled		1	1
Coal, left for bottom			5
Shale, dark.			

Proximate analysis

	As received	Moisture free
Moisture	3.11	0.00
Volatile matter	41.81	43.15
Fixed carbon	47.74	49.28
Ash	7.34	7.57
	100.00	100.00
Sulphur	3.45	3.56
Air drying loss 1.16 per cent		
Heating value { Calories	7,306	7,540
Heating value { B. t. u.	13,152	13,574
Fusion of ash { Incipient	2,360°F.	
Fusion of ash { Complete	2,437°F.	

Sample of Pittsburgh coal taken in 1907 by J. E. Hyde from mine of the Captina Coal Co., northeast quarter of Section 10, Washington Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, draw slate, rejected			10
Coal, bony, rejected			3
Breast coal, with three thin partings, sampled		2	8
Shale, rejected			1
Coal, bearing-in, sampled			8½
Shale, rejected			⅜
Coal, brick, containing several smut bands, sampled	*Pittsburgh*	1	8½
Shale, rejected			½
Coal, bottom, with occasional pyrite lenses, sampled		1	1
Pyrite, rejected			½
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	2.79	0.00
Volatile matter	37.88	38.97
Fixed carbon	49.91	51.34
Ash	9.42	9.69
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.76	71.76
Hydrogen	5.25	5.08
Oxygen	9.39	7.11
Nitrogen	1.09	1.12
Sulphur	5.09	5.24
Ash	9.42	9.69
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	7,215	7,422
	B. t. u.	12,987	13,360

Sample of Pittsburgh coal taken in 1914 by R. V. A. Mills from the Simeon Jeffries mine, at Temperanceville, northeast quarter of Section 33, Somerset Township, Belmont County.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled	*Pittsburgh*		7½
Mother coal, excluded			½
Coal, sampled			4½
Coal, bony, excluded			¾
Coal, sampled		1	7
Pyrite, excluded			¼
Coal, sampled		1	0
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.72	0.00
Volatile matter	41.01	42.59
Fixed carbon	45.78	47.55
Ash	9.49	9.86
	100.00	100.00
Sulphur	4.57	4.75
Air drying loss 2.0 per cent		
Heating value — Calories	7,089	7,363
Heating value — B. t. u.	12,760	13,253

Sample of Pittsburgh coal taken in 1907 by J. E. Hyde from the Simeon Jeffries mine, at Temperanceville, northeast quarter of Section 33, Somerset Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, unmeasured.			
Coal, with three thin partings, sampled	*Pittsburgh*		10
Shale and pyrite, rejected			¾
Coal, with local thin partings, sampled		3	0
Clay.			

[1]United States Geological Survey, Bull. 621, pp. 263, 333.

Proximate analysis

	As received	Moisture free
Moisture*	4.08	0.00
Volatile matter	37.08	38.66
Fixed carbon	48.23	50.28
Ash	10.61	11.06
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.77	71.69
Hydrogen	4.89	4.63
Oxygen	9.68	6.31
Nitrogen	1.10	1.15
Sulphur	4.95	5.16
Ash	10.61	11.06
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,931	7,226
	B. t. u.	12,476	13,006

*Sample slightly wet. Moisture possibly one-half per cent high.

Sample of Pittsburgh coal taken in 1927 by Leitch and Francis from Moonshine mine, operated by Leatherwood Coal Co., 1½ miles west of Baileys Mills, central Section 7, Millwood Township, Guernsey County.[1] Sample taken 1,100 feet from entrance.

		Ft.	In.
Coal, sampled			5
Shale, rejected			¼
Coal, sampled	*Pittsburgh*		10½
Shale, rejected			¼
Coal, sampled		2	9

Proximate analysis

	As received	Moisture free
Moisture	4.5	0.0
Volatile matter	40.6	42.5
Fixed carbon	46.6	48.8
Ash	8.3	8.7
	100.0	100.0

Ultimate analysis

	As received	Moisture free
Carbon	70.3	73.6
Hydrogen	5.4	5.2
Oxygen	10.3	6.4
Nitrogen	1.1	1.2
Sulphur	4.6	4.9
Ash	8.3	8.7
	100.0	100.0

Air drying loss 2.8 per cent

		As received	Moisture free
Heating value	Calories	7,111	7,444
	B. t. u.	12,800	13,400

Sample taken from above mine 1,500 feet from entrance at face.[2]

[1]United States Bureau of Mines, unpublished.
[2]Idem.

		Ft.	In.
Shale, roof, good.			
Coal, sampled	*Pittsburgh*		11
Shale, rejected			1
Coal, sampled			5½
Shale, rejected			¼
Coal, sampled		2	7
Limestone, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.9	0.0
Volatile matter	39.8	41.5
Fixed carbon	46.8	48.6
Ash	9.5	9.9
	100.0	100.0

Ultimate analysis

	As received	Moisture free
Carbon	69.9	72.7
Hydrogen	5.2	5.0
Oxygen	9.3	6.1
Nitrogen	1.2	1.2
Sulphur	4.9	5.1
Ash	9.5	9.9
	100.0	100.0

Air drying loss 2.2 per cent

		As received	Moisture free
Heating value	Calories	7,028	7,311
	B. t. u.	12,650	13,160

Sample taken from above mine at face 1,200 feet from entrance.[1]

		Ft.	In.
Shale, good, roof.			
Coal, sampled	*Pittsburgh*		5
Shale, excluded			½
Coal, sampled			8½
Shale, excluded			¾
Coal, sampled			3
Shale, excluded			¼
Coal, sampled		2	9
Limestone, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.7	0.0
Volatile matter	40.4	42.4
Fixed carbon	46.3	48.5
Ash	8.6	9.1
	100.0	100.0
Sulphur	4.2	4.4

Air drying loss 2.7 per cent

[1] Idem.

		As received	Moisture free
Heating value	Calories	7,072	7,422
	B. t. u.	12,730	13,360

Composite of three samples above.[1]

Proximate analysis

	As received	Moisture free
Moisture	4.3	0.0
Volatile matter	40.3	42.1
Fixed carbon	46.5	48.6
Ash	8.9	9.3
	100.0	100.0

Ultimate analysis

	As received	Moisture free
Carbon	72.9	76.1
Hydrogen	5.5	5.2
Oxygen	6.9	3.3
Nitrogen	1.2	1.3
Sulphur	4.6	4.8
Ash	8.9	9.3
	100.0	100.0

Air drying loss 2.6 per cent

		As received	Moisture free
Heating value	Calories	7,072	7,389
	B. t. u.	12,730	13,300

Sample of Pittsburgh coal taken in 1914 by D. D. Condit from Samuel Sayre mine, one and one-half miles northwest of Quaker City Station, southwest Section 21, Millwood Township, Guernsey County.[2]

		Ft.	In.
Shale, roof.			
Coal, bony, excluded	*Pittsburgh*		4
Coal, sampled			9
Pyrite, excluded			1
Coal, sampled		1	8
Shale, excluded			½
Coal, sampled			3½
Shale, excluded			½
Coal, sampled			11
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.36	0.00
Volatile matter	41.14	43.02
Fixed carbon	45.76	47.84
Ash	8.74	9.14
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.30	72.46
Hydrogen	5.37	5.11
Oxygen	10.48	6.90
Nitrogen	1.26	1.32
Sulphur	4.85	5.07
Ash	8.74	9.14
	100.00	100.00

Air drying loss 2.2 per cent

[1]Idem.

[2]United States Geological Survey, Bull. 621, pp. 264,333.

		As received	Moisture free
Heating value	Calories	7,061	7,383
	B. t. u.	12,710	13,289

Sample of Pittsburgh coal taken in 1927 by G. W. White and P. E. Fitzgerald from mine of W. E. Rice, located three miles south of New Concord, on county line, northeast Section 12, Union Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Clay shale		3	0
Coal, good, sampled	*Pittsburgh*		1½
Coal, shaly, sampled			⅜
Coal, good, sampled			9
Coal, shaly, sampled			¼
Coal, good, sampled			8
Clay shale, rejected			⅜
Coal, good, sampled			8
Clay shale.			

Proximate analysis

	As received	Moisture free
Moisture	6.71	0.00
Volatile matter	40.17	43.06
Fixed carbon	41.98	45.00
Ash	11.14	11.94
	100.00	100.00
Sulphur	5.20	5.58

Air drying loss 1.39 per cent

Heating value	Calories	6,496	6,963
	B. t. u.	11,693	12,534
Fusion of ash	Incipient	1,994°F.	
	Complete	2,107°F.	

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from Alfred Waymer bank, near Joy, west side of Sharps Fork, west central Section 2, Homer Township, Morgan County. Analysis by Lord and Somermeier.

			Ft.	In.
Upper bench	Coal, sampled	*Pittsburgh*	1	6
	Bone coal, rejected			8
Clay shale, rejected				11
Lower bench	Coal, sampled			2
	Shale, sampled			⅛
	Coal, sampled			7½
	Shale, sampled			½
	Coal, sampled			3
	Shale, sampled			⅜
	Coal, sampled			1½
	Shale, sampled			⅜
	Coal, sampled		2	0

Clay, unmeasured.

Proximate analysis

	As received	Moisture free
Moisture*	6.87	0.00
Volatile matter	40.55	43.54
Fixed carbon	44.39	47.67
Ash	8.19	8.79
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.39	72.36
Hydrogen	5.32	4.90
Oxygen	13.98	8.46
Nitrogen	0.90	0.96
Sulphur	4.22	4.53
Ash	8.19	8.79
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,722	7,218
	B. t. u.	12,100	12,992

*Sample slightly wet. Moisture possibly 1 per cent high.

Sample of Pittsburgh coal in E. M. Blower mine on the D. E. Carr property, near the center of Section 28, Homer Township, Morgan County. Taken by E. S. Bonnet, May 22, 1929. Analysis by D. J. Demorest.

		Ft.	In.
Coal	*Pittsburgh*	1	1½
Bone, rejected			1½
Coal			4½
Light clay shale, rejected		1	1¼
Coal			5
Bone, rejected			1
Coal			10¼
Sulphur, rejected			¼
Coal		1	8¼
Sulphur, rejected			¼
Coal			8¼

Many sulphur boulders in lower 8¼ inches.

Proximate analysis

	As received	Moisture free
Moisture	4.80	0.00
Volatile matter	42.22	44.35
Fixed carbon	43.03	45.20
Ash	9.95	10.45
	100.00	100.00
Sulphur	5.19	5.45
Heating value (Calories)	6,600	6,933
Heating value (B. t. u.)	11,880	12,479

Sample of lower bench of Pittsburgh coal taken in 1928 by W. Stout, L. O. Naffziger, and Richard Morgan from mine on the W. G. Selby property, L. E. Harris, lessee, east central Section 30, Bern Township, Athens County. Analysis by D. J. Demorest.

		Ft.	In.
Clay, gray		1	¼
Coal, sampled	Lower bench of *Pittsburgh*		2¾
Shale, gray, rejected			½
Coal, sampled			6¼
Shale, pyritiferous, rejected			½
Coal, sampled			3⅜
Shale, pyritiferous, rejected			½
Coal, sampled		1	6⅜
Pyrite, rejected			¾
Coal, sampled			9½

Proximate analysis

	As received	Moisture free
Moisture	5.87	0.00
Volatile matter	41.93	44.54
Fixed carbon	43.39	46.10
Ash	8.81	9.36
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.06	71.24
Hydrogen	5.35	5.00
Oxygen	13.72	9.02
Nitrogen	1.05	1.12
Sulphur	4.01	4.26
Ash	8.81	9.36
	100.00	100.00

Air drying loss 1 per cent

		As received	Moisture free
Heating value	Calories	6,806	7,230
	B. t. u.	12,251	13,015

Fusion of ash	Incipient	2,330°F.
	Complete	2,430°F.

Sample of upper bench of Pittsburgh coal taken in 1928 by W. Stout, L. O. Naffziger, and Richard Morgan, from mine on W. G. Selby property, L. E. Harris, lessee, east central Section 30, Bern Township, Athens County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, massive.			
Shale, siliceous, gray		2	0
Coal, good, sampled	Upper bench of *Pittsburgh*	3	4
Shale, hard, bony, rejected		1	1¼
Coal, somewhat shaly, sampled			3¼
Clay, gray		1	¼

Proximate analysis

	As received	Moisture free
Moisture	6.31	0.00
Volatile matter	43.16	46.07
Fixed carbon	42.95	45.84
Ash	7.58	8.09
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.28	71.81
Hydrogen	5.49	5.11
Oxygen	14.38	9.37
Nitrogen	1.52	1.62
Sulphur	3.75	4.00
Ash	7.58	8.09
	100.00	100.00

Air drying loss 1.17 per cent

		As received	Moisture free
Heating value	Calories	6,879	7,342
	B. t. u.	12,383	13,217

Fusion of ash: Incipient 2,330°F. Complete 2,430°F.

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of Black Diamond Coal and Coke Co., at Lathrop, northeast quarter of Section 28, Bern Township, Athens County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, unmeasured.			
Upper bench	Coal, sampled	2	7
	Bonecoal, rejected	1	1
Clay shale, rejected		1	0
Lower bench	Coal, sampled		10
	Shale, sampled		3/8
	Coal, sampled		4
	Shale, sampled		1/4
	Coal, sampled		9
	Shale, sampled		1/4
	Coal, sampled		8
	Shale, sampled		1/4
	Coal, sampled		10
Clay, unmeasured.			

Pittsburgh

Proximate analysis

	As received	Moisture free
Moisture	5.78	0.00
Volatile matter	37.43	39.73
Fixed carbon	48.79	51.78
Ash	8.00	8.49
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.55	71.69
Hydrogen	5.14	4.78
Oxygen	14.17	9.58
Nitrogen	0.95	1.01
Sulphur	4.19	4.45
Ash	8.00	8.49
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,833	7,252
	B. t. u.	12,299	13,053

Sample of Pittsburgh coal in new drift, Black Diamond mine, No. 1 room off second west entry, north center of Section 28, Bern Township, Athens County. Taken by E. S. Bonnet, May 23, 1929. Analysis by D. J. Demorest.

		Ft.	In.
Coal			5
Sulphur, rejected			2
Coal		2	2½
Sulphur, rejected			5½
Coal		1	3
Bone, rejected	*Pittsburgh*		11
Clay, rejected		1	0
Bone, rejected			1½
Coal		2	8
Sulphur, rejected			1
Coal			8

Proximate analysis

	As received	Moisture free
Moisture	3.62	0.00
Volatile matter	44.84	46.52
Fixed carbon	44.69	46.37
Ash	6.85	7.11
	100.00	100.00
Sulphur	3.74	3.88
Heating value (Calories)	6,980	7,242
Heating value (B. t u.)	12,564	13,036

Sample of Pittsburgh coal in new drift, Black Diamond mine, No. 7 room off second west entry, north center of Section 28, Bern Township, Athens County. Taken by E. S. Bonnet, May 23, 1929. Analysis by D. J. Demorest.

		Ft.	In.
Coal			5
Sulphur, rejected			2
Coal		2	1
Sulphur, rejected			5
Coal	*Pittsburgh*	1	9
Bone, rejected			7
Clay, rejected		1	0
Bone, rejected			2½
Coal		3	9

Several thin shale streaks, which were not rejected in sampling, occur in lower bench.

Proximate analysis

	As received	Moisture free
Moisture	3.70	0.00
Volatile matter	43.85	45.53
Fixed carbon	44.61	46.33
Ash	7.84	8.14
	100.00	100.00
Sulphur	4.24	4.40
Heating value — Calories	6,949	7,216
Heating value — B. t. u.	12,508	12,989

Sample of lower bench of Pittsburgh coal taken in 1928 by L. O. Naffziger and Richard Morgan from the mine of the Jennings Coal Co., Edward Kennedy, lessee, on Marietta Run, in west central Section 14, Bern Township, Athens County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, rejected			11
Coal, bony, rejected	Lower bench of *Pittsburgh*		5/8
Coal, sampled			1 1/8
Coal, bony, rejected			3/8
Coal, sampled			8
Shale, gray, sampled			1/4
Coal, sampled			2 7/8
Shale, pyritiferous, sampled			1/4
Coal, sampled			1 3/8
Coal, bony, sampled			1/4
Coal, sampled			7 1/4
Mother coal, sampled			1/4
Coal, sampled		1	9 3/4
Shale, gray, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.94	0.00
Volatile matter	40.15	42.68
Fixed carbon	45.26	48.12
Ash	8.65	9.20
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.82	72.10
Hydrogen	5.32	4.96
Oxygen	13.58	8.82
Nitrogen	1.28	1.36
Sulphur	3.35	3.56
Ash	8.65	9.20
	100.00	100.00

Air drying loss 0.6 per cent

		As received	Moisture free
Heating value	Calories	6,774	7,202
	B. t. u.	12,194	12,964
Fusion of ash	Incipient	2,374°F.	
	Complete	2,416°F.	

Sample of the upper bench of Pittsburgh coal taken in 1928 by L. O. Naffziger and Richard Morgan from the mine of the Jennings Coal Co., Edward Kennedy, lessee, on Marietta Run, in west central Section 14, Bern Township, Athens County. Sample was moist. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, roof.			
Coal, sampled	Upper bench of *Pittsburgh*	2	5½
Mother coal, sampled			¼
Coal, sampled			4
Mother coal, sampled			¼
Coal, sampled			11½
Shale, gray, rejected			¾
Coal, bony, rejected		1	5½
Shale, gray, rejected			1
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	5.66	0.00
Volatile matter	43.96	46.60
Fixed carbon	43.52	46.13
Ash	6.86	7.27
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.25	72.34
Hydrogen	5.46	5.12
Oxygen	14.25	9.78
Nitrogen	1.08	1.14
Sulphur	4.10	4.35
Ash	6.86	7.27
	100.00	100.00

Air drying loss 1.2 per cent

		As received	Moisture free
Heating value	Calories	6,939	7,355
	B. t. u.	12,491	13,240
Fusion of ash	Incipient	2,300°F.	
	Complete	2,416°F.	

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of the Federal Coal Co., at Broadwell, south central Section 13, Bern Township, Athens County. Analysis by Lord and Somermeier.

			Ft.	In.
Upper bench	Coal, sampled		1	3
	Bone coal, rejected			8¼
	Coal, sampled			4
Clay shale, rejected			1	0
Lower bench	Coal, sampled	*Pittsburgh*		6
	Shale, sampled			⅜
	Coal, sampled			2
	Shale, sampled			¼
	Coal, sampled		2	5
Clay, unmeasured.				

The sample which was analyzed with the following results included the lower bench only.

Proximate analysis	As received	Moisture free
Moisture	6.60	0.00
Volatile matter	35.05	37.53
Fixed carbon	48.15	51.55
Ash	10.20	10.92
	100.00	100.00

Ultimate analysis	As received	Moisture free
Carbon	66.61	71.32
Hydrogen	5.13	4.71
Oxygen	13.72	8.40
Nitrogen	0.93	1.00
Sulphur	3.41	3.65
Ash	10.20	10.92
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,607	7,074
	B. t. u.	11,893	12,733

The upper bench also was analyzed separately with the following results:

Proximate analysis	As received	Moisture free
Moisture	4.51	0.00
Volatile matter	38.24	40.05
Fixed carbon	45.76	47.92
Ash	11.49	12.03
	100.00	100.00

Ultimate analysis	As received	Moisture free
Carbon	65.92	69.03
Hydrogen	5.10	4.82
Oxygen	11.62	7.97
Nitrogen	0.99	1.04
Sulphur	4.88	5.11
Ash	11.49	12.03
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,636	6,949
	B. t. u.	11,945	12,508

Sample of Pittsburgh coal taken in 1928 by W. Stout, L. O. Naffziger, and Richard Morgan from the Richard Phillips mine in the southwestern part of Section 33, Canaan Township, Athens County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Shale, bony, rejected			$\frac{3}{4}$
Coal, sampled	*Pittsburgh*		$5\frac{1}{2}$
Coal, bony, sampled			$\frac{1}{4}$
Coal, sampled			$3\frac{3}{8}$
Mother coal with pyrite, sampled			$\frac{1}{8}$
Coal, sampled			$2\frac{5}{8}$
Shale, gray, sampled			$\frac{1}{8}$
Coal, sampled			4
Coal, bony, sampled			$\frac{1}{4}$
Coal, sampled		1	$3\frac{1}{8}$
Shale, gray, sampled			$\frac{1}{8}$
Coal, sampled			$7\frac{3}{4}$
Clay shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	7.37	0.00
Volatile matter	39.02	42.12
Fixed carbon	42.53	45.92
Ash	11.08	11.96
	100.00	100.00
Sulphur	4.20	4.54

Air drying loss 1.38 per cent

Heating value	Calories	6,407	6,917
	B. t. u.	11,533	12,451

Fusion of ash	Incipient	2,285°F.
	Complete	2,444°F.

Sample of upper bench of Pittsburgh coal taken in 1928 by L. O. Naffziger and Richard Morgan from the mine of J. M. Beatty in the central part of Section 30, Lodi Township, Athens County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, roof.			
Coal, sampled	Upper bench of *Pittsburgh*	1	2
Pyrite, irregular, rejected			3
Coal, sampled		1	4¼
Coal, bony, rejected			5½
Coal, sampled			5½
Shale, gray, rejected			½
Clay, gray, rejected			8½

Proximate analysis

	As received	Moisture free
Moisture	6.73	0.00
Volatile matter	41.20	44.17
Fixed carbon	40.99	43.95
Ash	11.08	11.88
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.57	69.23
Hydrogen	5.34	4.92
Oxygen	15.10	9.78
Nitrogen	1.13	1.21
Sulphur	2.78	2.98
Ash	11.08	11.88
	100.00	100.00

Air drying loss 1.6 per cent

		As received	Moisture free
Heating value	Calories	6,500	6,969
	B. t. u.	11,700	12,544

Fusion of ash	Incipient	2,190°F.
	Complete	2,402°F.

Sample of lower bench of Pittsburgh coal taken in 1928 by L. O. Naffziger and Richard Morgan from the mine of J. M. Beatty in the central part of Section 30, Lodi Township, Athens County. Analysis by D. J. Demorest. Sample moist.

		Ft.	In.
Shale, gray, roof.			
Coal, sampled	Lower bench of *Pittsburgh*		3¾
Shale, gray, rejected			7/16
Coal, sampled			9
Shale, gray, sampled			¼
Coal, sampled			1
Shale, gray, sampled			¼
Coal, sampled			4¼
Pyrite, rejected			2
Coal, sampled			9½
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	8.52	0.00
Volatile matter	39.15	42.79
Fixed carbon	42.44	46.40
Ash	9.89	10.81
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.19	70.17
Hydrogen	5.41	4.87
Oxygen	15.85	9.06
Nitrogen	1.60	1.75
Sulphur	3.06	3.34
Ash	9.89	10.81
	100.00	100.00

Air drying loss 2.8 per cent

		As received	Moisture free
Heating value	Calories	6,442	7,042
	B. t. u.	11,595	12,675

Fusion of ash	Incipient	2,205°F.
	Complete	2,444°F.

Sample of Pittsburgh coal taken in 1928 by W. Stout, L. O. Naffziger, and Richard Morgan on the property of Jones Brothers, one-half mile northeast of Pleasanton, east central Alexander Township, Athens County. The mine was wet and the sample moist. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Coal, sampled	*Pittsburgh*	1	¾
Shale, bony, rejected			½
Coal, sampled			5⅛
Shale, with pyrite, sampled			⅛
Coal, sampled		1	3
Pyrite, irregular, rejected			¼
Coal, sampled			11¾

Proximate analysis

	As received	Moisture free
Moisture	7.13	0.00
Volatile matter	41.51	44.70
Fixed carbon	42.09	45.32
Ash	9.27	9.98
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.40	69.34
Hydrogen	5.40	4.97
Oxygen	15.45	9.81
Nitrogen	0.96	1.03
Sulphur	4.52	4.87
Ash	9.27	9.98
	100.00	100.00

Air drying loss 1.68 per cent

		As received	Moisture free
Heating value	Calories	6,559	7,062
	B. t. u.	11,807	12,713

Fusion of ash	Incipient	2,345°F.
	Complete	2,458°F.

Sample of Pittsburgh coal taken in 1928 by L. O. Naffziger and Richard Morgan from the mine of John Haning in the northeast quarter of Section 35, Bedford Township, Meigs County. The mine was wet but the sample was dry. Analysis by D. J. Demorest.

		Ft.	In.
Coal, roof, rejected			
Coal, sampled		1	1¼
Shale, gray, sampled			¼
Coal, sampled			¾
Shale, gray, sampled			¼
Coal, sampled			2¼
Shale, gray, sampled	*Pittsburgh*		⅛
Coal, sampled			½
Shale, gray, sampled			⅜
Coal, sampled		1	4⅛
Shale, gray, sampled			⅜
Coal, sampled			10½
Shale, gray, floor.			

Proximate analysis

	As received	Moisture free
Moisture	5.43	0.00
Volatile matter	42.40	44.83
Fixed carbon	41.19	43.56
Ash	10.98	11.61
	100.00	100.00
Sulphur	6.80	7.19

Air drying loss 1.17 per cent

		As received	Moisture free
Heating value	Calories	6,517	6,891
	B. t. u.	11,731	12,404
Fusion of ash	Incipient	2,402°F.	
	Complete	2,472°F.	

Sample of Pittsburgh coal taken in 1928 by L. O. Naffziger and Richard Morgan from the mine of John Carl, one and one-half miles northwest of Kingsbury at forks of road on Kingsbury Run, northeast Section 20, Bedford Township, Meigs County. Analysis by D. J. Demorest. Sample moist and weathered, with considerable of admixed clay.

		Ft.	In.
Shale, gray, roof			
Coal, bony, rejected	*Pittsburgh*		1
Coal, sampled		2	1½
Shale, gray, sampled			¼
Coal, sampled			11½
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	21.45	0.00
Volatile matter	32.49	41.36
Fixed carbon	36.80	46.85
Ash	9.26	11.79
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	48.91	62.26
Hydrogen	5.32	3.75
Oxygen	33.82	18.77
Nitrogen	1.05	1.34
Sulphur	1.64	2.09
Ash	9.26	11.79
	100.00	100.00

Air drying loss 3.76 per cent

		As received	Moisture free
Heating value	Calories	4,541	5,781
	B. t. u.	8,173	10,407
Fusion of ash	Incipient	2,300°F.	
	Complete	2,430°F.	

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from J. I. O'dell bank, south central Section 9, Green Township, Gallia County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, roof		1	2
Coal, bony, sampled	*Pittsburgh*		7
Shale, sampled			⅛
Coal, sampled			11
Shale, rejected			¾
Coal, sampled		1	1
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	6.73	0.00
Volatile matter	34.34	36.82
Fixed carbon	45.90	49.21
Ash	13.03	13.97
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	62.30	66.80
Hydrogen	5.11	4.68
Oxygen	14.05	8.65
Nitrogen	1.14	1.22
Sulphur	4.37	4.68
Ash	13.03	13.97
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,356	6,814
	B. t. u	11,441	12,266

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from the mine of J. N. Kerns, northeast Section 15, Harrison Township, Gallia County. Analysis by Lord and Somermeier.

			Ft.	In.
Upper bench	Coal, sampled	*Pittsburgh*	2	5
	Coal, shaly, sampled			1
	Coal, sampled			6
	Shale, sampled			1¾
	Coal, sampled			11½
Parting	Pyrite, rejected			⅝
	Coal, rejected			1
	Pyrite, rejected			¾
Lower bench	Coal, sampled			8½
	Shale, sampled			¼
	Coal, sampled			10

Clay, unmeasured.

Proximate analysis

	As received	Moisture free
Moisture	6.98	0.00
Volatile matter	36.14	38.85
Fixed carbon	47.85	51.44
Ash	9.03	9.71
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.91	69.77
Hydrogen	5.24	4.81
Oxygen	14.60	9.03
Nitrogen	1.01	1.08
Sulphur	5.21	5.60
Ash	9.03	9.71
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,583	7,076
	B. t. u.	11,849	12,737

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from mine of A. V. Houck, southwest Section 7, Harrison Township, Gallia County. Analysis by Lord and Somermeier.

			Ft.	In.
Roof coal, reported	Coal, not sampled			5
	Clay shale, not sampled			9
	Coal, not sampled			10
	Clay shale, not sampled			3
	Coal, not sampled		1	3
Shale, dark, rejected				2
Coal, upper bench, sampled				4½
Clay shale, rejected		*Pittsburgh*		3
Coal, lower bench	Coal, sampled		1	1
	Shale, sampled			¼
	Coal, sampled			1
	Shale, very thin, sampled			1/16
	Coal, sampled		1	5¾
Clay.				

Proximate analysis

	As received	Moisture free
Moisture	7.83	0.00
Volatile matter	34.15	37.05
Fixed carbon	48.26	52.36
Ash	9.76	10.59
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.59	70.07
Hydrogen	5.18	4.68
Oxygen	15.49	9.26
Nitrogen	1.09	1.18
Sulphur	3.89	4.22
Ash	9.76	10.59
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value	Calories	6,544	7,099
	B. t. u.	11,779	12,778

Sample of Pittsburgh coal taken in 1907 by B. A. Eisenlohr from Klondyke mine, operated by Swan Creek Coal Co., of Gallipolis, one and one-half miles south of Bladen, northeast Ohio Township, Gallia County. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone, massive.			
Shale, reported		2	6
Coal, upper bench, sampled	*Pittsburgh*		4½
Clay shale, rejected		1	0
Coal, lower bench, sampled		2	9
Clay, unmeasured			

Proximate analysis

	As received	Moisture free
Moisture	5.80	0.00
Volatile matter	36.76	39.02
Fixed carbon	47.38	50.30
Ash	10.06	10.68
	100.00	100.00

*Ultimate analysis**

	As received	Moisture free
Carbon	64.94	68.94
Hydrogen	5.16	4.80
Oxygen	14.40	9.81
Nitrogen	1.10	1.17
Sulphur	4.34	4.60
Ash	10.06	10.68
	100.00	100.00

Moisture in air-dried sample about 3 per cent

		As received	Moisture free
Heating value*	Calories	6,551	6,954
	B. t. u.	11,792	12,517

*Ultimate and heating value not determined until several weeks after preparation of sample. Fresh sample calorific value about 100 calories low.

THE POMEROY OR No. 8a COAL

The Pomeroy coal was regarded as the Pittsburgh until 1907 when work by Condit showed that it lies above the Pittsburgh and on the horizon of the Redstone. The relative positions of the two beds are shown in a section on page 179.

The Pomeroy (Redstone) bed is found in the hills fronting on the Ohio River in Belmont County and can be followed southwest across the State. However, it has little or no value until Meigs County is reached where it expands rapidly and where it has long been the basis of an important mining industry. The coal appears at its best in Salisbury Township but has mining thickness in two or three adjacent townships, and these constitute the Pomeroy field. The coal dips below drainage a few miles above Pomeroy and at Syracuse it lies 80 feet below the flood plain of the Ohio River. Farther east the drill has shown the coal to have workable thickness. North from Pomeroy and vicinity the coal thins rapidly.

The Pomeroy coal has two or more partings in most places but these are not persistent and the coal therefore has no definite structure. This is shown in sections farther on. Overlying the coal is the massive Pomeroy sandstone, but in most places a thin bed of shale separates the two.

Formerly the coal was shipped by river to Cincinnati and more distant places but with the building of railroads the market changed to the northwest. From an early date the coal had a large use in salt making at Pomeroy, and in fact the exhaustion of the coal in the river front hills has increased the expense of that industry and in part is re-

sponsible for its decline. The great use for the fuel at present is steam generation and general heating.

West from the Pomeroy field the coal thins but is an important source of fuel to the farmers and villagers. Throughout this area the thickness in most places ranges from 2 to 3 feet, but at its extreme western limit, Greasy Ridge in eastern Lawrence County, the bed measures 5 feet.

Sections and analyses

Sample of Pomeroy coal taken in 1928 by L. O. Naffziger and Richard Morgan from the mine of William Beal, in the northwest quarter of Section 32, Bedford Township, Meigs County. Analysis by D. J. Demorest.

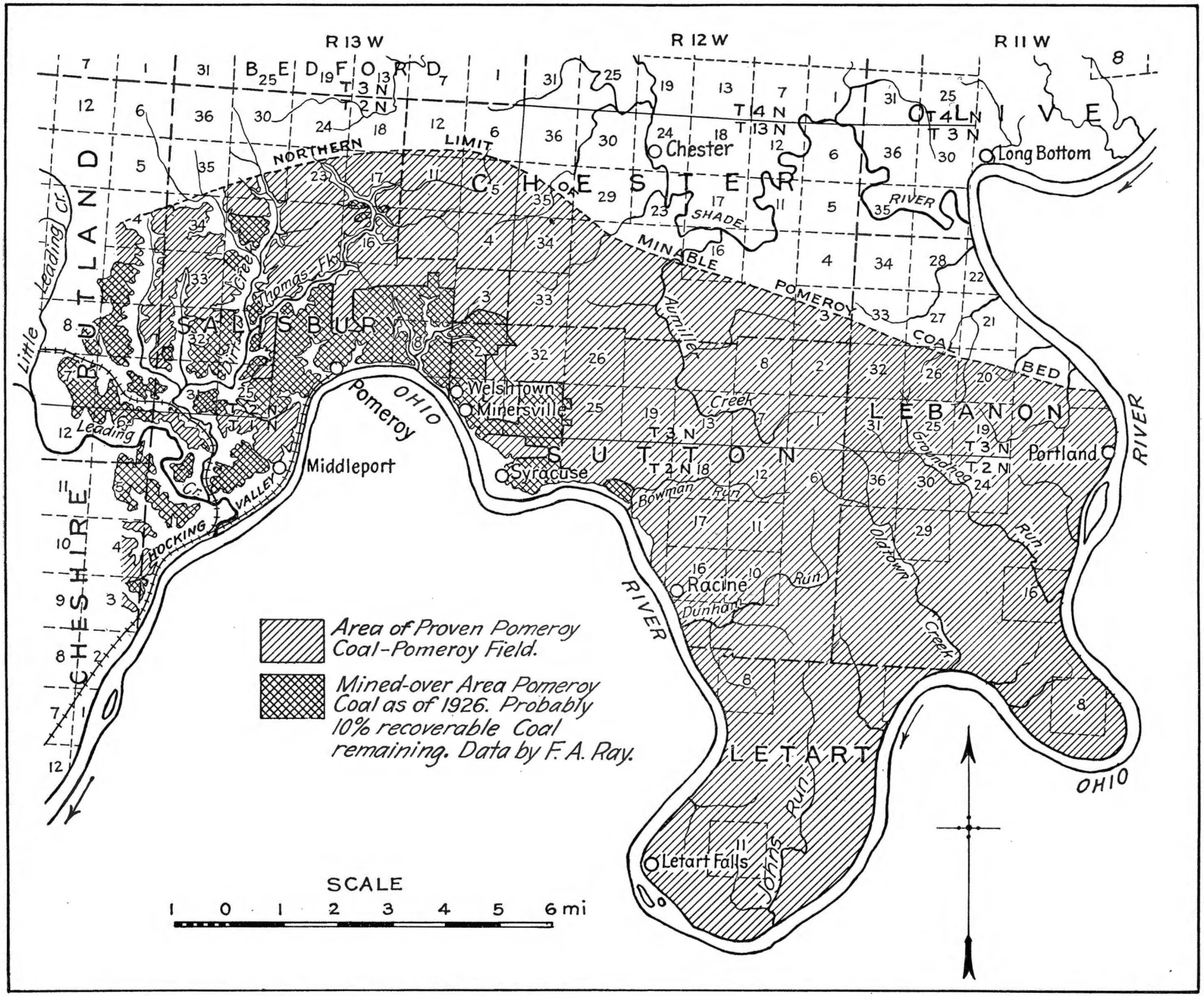
		Ft.	In.
Clay, roof.			
Shale, irregular, pyritiferous, rejected			2¼
Coal, sampled	*Pomeroy*		9½
Shale, gray, rejected	*Pomeroy*		½
Coal, sampled	*Pomeroy*	2	4

Proximate analysis

	As received	Moisture free
Moisture	7.02	0.00
Volatile matter	39.70	42.70
Fixed carbon	42.87	46.11
Ash	10.41	11.19
	100.00	100.00
Sulphur	6.16	6.63
Air drying loss 0.83 per cent		
Heating value — Calories	6,463	6,951
Heating value — B. t. u.	11,634	12,512
Fusion of ash — Incipient	2,430°F.	
Fusion of ash — Complete	2,486°F.	

Sample of Pomeroy coal taken in 1907 by B. A. Eisenlohr from mine of W. F. Bartels, at Syracuse, Sutton Township, Meigs County. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone, unmeasured			
Coal, impure, sampled			7½
Coal, horny, sampled			5½
Coal, sampled	*Pomeroy*	1	4
Coal, horny, sampled			2½
Coal, sampled		2	3½
Clay, unmeasured.			



MAP OF THE POMEROY FIELD OF POMEROY OR REDSTONE COAL

Proximate analysis

	As received	Moisture free
Moisture	4.85	0.00
Volatile matter	36.28	38.13
Fixed carbon	46.35	48.71
Ash	12.52	13.16
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.29	68.62
Hydrogen	5.32	5.02
Oxygen	12.76	8.88
Nitrogen	1.17	1.23
Sulphur	2.94	3.09
Ash	12.52	13.16
	100.00	100.00

Moisture in air-dried sample about 4 per cent

		As received	Moisture free
Heating value	Calories	6,624	6,962
	B. t. u.	11,923	12,531

Sample of Pomeroy coal taken in 1907 by B. A. Eisenlohr from mine of Peacock Coal Co., at Pomeroy, Salisbury Township, Meigs County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, reported thickness		2	0
Coal, impure, rejected	*Pomeroy*		6½
Coal, bony, rejected	*Pomeroy*		5½
Coal, sampled	*Pomeroy*	3	3
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	7.33	0.00
Volatile matter	34.59	37.32
Fixed carbon	49.39	53.30
Ash	8.69	9.38
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.71	71.99
Hydrogen	5.53	5.09
Oxygen	15.96	10.19
Nitrogen	1.06	1.14
Sulphur	2.05	2.21
Ash	8.69	9.38
	100.00	100.00

Moisture in air-dried sample about 4 per cent

		As received	Moisture free
Heating value	Calories	6,725	7,257
	B. t. u.	12,105	13,062

Sample of Pomeroy coal taken in 1907 by B. A. Eisenlohr from Logan mine of the Peacock Coal Co., at Pomeroy, Salisbury Township, Meigs County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, bony and dirty, sampled	*Pomeroy*	1	3
Coal, good, sampled		1	8
Shale, less than ⅛ inch, sampled			⅛
Coal, sampled			3
Shale, very thin, sampled			⅛
Coal, sampled		2	3
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	7.22	0.00
Volatile matter	32.82	35.38
Fixed carbon	50.67	54.61
Ash	9.29	10.01
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.47	71.64
Hydrogen	5.39	4.95
Oxygen	16.43	10.79
Nitrogen	1.10	1.19
Sulphur	1.32	1.42
Ash	9.29	10.01
	100.00	100.00

Moisture in air-dried sample about 4 per cent

		As received	Moisture free
Heating value	Calories	6,668	7,187
	B. t. u.	12,002	12,936

Sample of Pomeroy coal taken in 1928 by L. O. Naffziger and Richard Morgan from the mine of William Grueser in the south central part of Section 17, Salisbury Township, Meigs County. Analysis by D. J. Demorest.

		Ft.	In.
Coal, bony, rejected	*Pomeroy*		3¼
Coal, sampled		3	4
Coal, bony, rejected			1¼
Shale, gray, floor.			

Proximate analysis

	As received	Moisture free
Moisture	6.05	0.00
Volatile matter	41.96	44.66
Fixed carbon	43.76	46.58
Ash	8.23	8.76
	100.00	100.00
Sulphur	2.61	2.78

Air drying loss 0.79 per cent

Heating value	Calories	6,857	7,298
	B. t. u.	12,342	13,136
Fusion of ash	Incipient	2,458°F.	
	Complete	2,486°F.	

Sample of Pomeroy coal taken in 1907 by B. A. Eisenlohr from mine of W. D. Edwards, just north of Hobson Station, Salisbury Township, Meigs County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, horny and dirty, sampled	*Pomeroy*	1	10
Coal, good, sampled			9
Coal, horny, sampled			¾
Coal, sampled			10
Coal, impure, sampled			¼
Coal, good, sampled			2½
Coal, impure, sampled			¼
Coal, sampled		1	9½
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	5.51	0.00
Volatile matter	38.19	40.42
Fixed carbon	45.72	48.38
Ash	10.58	11.20
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.55	69.37
Hydrogen	5.40	5.07
Oxygen	13.35	8.94
Nitrogen	0.95	1.01
Sulphur	4.17	4.41
Ash	10.58	11.20
	100.00	100.00

Moisture in air-dried sample about 4 per cent

		As received	Moisture free
Heating value	Calories	6,661	7,049
	B. t. u.	11,99[illegible]	12,688

Sample of Pomeroy coal taken in 1907 by B. A. Eisenlohr from mine of Maynard Brothers, one mile southeast of Rutland, north central Section 7, Rutland Township, Meigs County. Analysis by Lord and Somermeier.

		Ft.	In.
Sandstone, unmeasured, *Pomeroy*.			
Shale		3	0
Coal, sampled	*Pomeroy*		6
Coal, impure, rejected			7
Coal, sampled			3
Shale, sampled			¼
Coal, sampled		1	0
Shale, rejected			1
Coal, rejected			1
Shale, rejected			⅜
Coal, sampled		1	3
Coal, splint, sampled			2¾
Coal, sampled		2	4
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	7.63	0.00
Volatile matter	33.33	36.08
Fixed carbon	48.11	52.09
Ash	10.93	11.83
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.29	70.68
Hydrogen	5.20	4.71
Oxygen	15.72	9.68
Nitrogen	1.03	1.12
Sulphur	1.83	1.98
Ash	10.93	11.83
	100.00	100.00

Moisture in air-dried sample about 4 per cent

		As received	Moisture free
Heating value	Calories	6,512	7,050
	B. t. u.	11,722	12,690

Sample of Pomeroy coal taken in 1907 by B. A. Eisenlohr from mine of Minshall Coal Co., at Carlton, near Gallia-Meigs county line, southeast Section 3, Cheshire Township, Gallia County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, unmeasured.			
Coal, sampled			3
Shale, sampled			$\frac{3}{8}$
Coal, sampled			2
Shale, sampled	*Pomeroy*		$\frac{1}{4}$
Coal, sampled			2
Shale, rejected			$\frac{5}{8}$
Coal, sampled		3	6
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	8.21	0.00
Volatile matter	34.23	37.29
Fixed carbon	46.10	50.22
Ash	11.46	12.49
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	62.95	68.58
Hydrogen	5.48	4.98
Oxygen	16.91	10.47
Nitrogen	1.02	1.11
Sulphur	2.18	2.37
Ash	11.46	12.49
	100.00	100.00

Moisture in air-dried sample about 4 per cent

		As received	Moisture free
Heating value	Calories	6,387	6,958
	B. t. u.	11,497	12,524

FISHPOT OR LOWER MEIGS CREEK COAL

The Fishpot[1] or Lower Meigs Creek coal is a persistent bed in eastern Ohio in Jefferson, Belmont, southeastern Harrison, eastern Guernsey, and eastern Noble counties, but southwest of this field in Morgan, Washington, Athens, Meigs, and Gallia counties it is seldom present although the associated limestone is not uncommon. In the main field the bed is broken by several irregular partings which impair the value of the member as a source of fuel. The thickness of the stratum varies from a few inches to 3 feet or more. It is mined only locally for domestic fuel.

Sections and analyses

Sample of Fishpot coal taken in 1926 by T. R. Meyers and G. W. White on Wegee Creek at water level, southwest Section 32, Mead Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, top.			
Coal, poor, rejected	*Fishpot*		2
Shale, dark, rejected			3
Coal, good, taken			4
Clay shale, gray, rejected			4
Coal, good, sampled			6
Shale, hard, dark, rejected			1½
Coal, good, sampled			5
Clay shale, gray, rejected			1
Coal, good, sampled			4½
Clay shale, bottom.			

Coal somewhat weathered and wet.

Proximate analysis

	As received	Moisture free
Moisture	2.54	0.00
Volatile matter	40.81	41.87
Fixed carbon	40.92	41.99
Ash	15.73	16.14
	100.00	100.00
Sulphur	5.00	5.13
Air drying loss 2.0 per cent		
Heating value — Calories	6,522	6,692
Heating value — B. t. u.	11,739	12,045
Fusion of ash — Incipient	2,190°F.	
Fusion of ash — Complete	2,300°F.	

[1]Name proposed by Wilber Stout for the member in unpublished report on the Monongahela series.

Sample of Fishpot coal taken in 1927 by G. W. White and P. E. Fitzgerald from mine of Amos Snyder, south central Section 29, Malaga Township, Monroe County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, shaly.			
Coal, shaly, rejected			2
Coal, good, sampled			2½
Shale, gray, with coaly bands, rejected			4
Coal, good, sampled			3
Shale, dark, rejected			1¼
Coal, good, sampled	*Fishpot*		5
Shale, gray, rejected			5
Coal, good, sampled			2½
Shale, dark, rejected			1
Coal, with thin shale bands, sampled			9½
Shale, gray, rejected			4
Coal, good, sampled			3
Shale, gray.			

Proximate analysis

	As received	Moisture free
Moisture	5.16	0.00
Volatile matter	37.73	39.78
Fixed carbon	37.49	39.53
Ash	19.62	20.69
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	59.61	62.85
Hydrogen	5.02	4.70
Oxygen	9.61	5.28
Nitrogen	0.95	1.00
Sulphur	5.19	5.48
Ash	19.62	20.69
	100.00	100.00

Air drying loss 2.6 per cent

		As received	Moisture free
Heating value	Calories	6,068	6,398
	B. t. u.	10,922	11,516

Fusion of ash	Incipient	2,116°F.
	Complete	2,210°F.

THE MEIGS CREEK, SEWICKLEY, OR No. 9 COAL

The Meigs Creek is the highest stratigraphically of the important coal beds of Ohio. Its position with reference to other members of the Monongahela series is well shown in sections on pages 179, 180. As these indicate, the bed lies from 70 to 100 feet above the Pittsburgh coal.

The Meigs Creek coal is due above drainage from Belmont County southwest to Gallia, but over much of this the bed is thin or wanting. In fact the workable part lies almost entirely east of the Muskingum River where it forms two fields: (1) the Belmont, including nearly the

whole of Belmont County, southeastern Harrison, northeastern Noble, and an undetermined part of northern Monroe; and (2) the Noble-Morgan field, including parts of Noble, eastern Morgan, southeastern Muskingum, western Monroe, and northern Washington counties.

The coal has no characteristic structure like its great neighbor, the Pittsburgh bed. In places it consists of a solid block of coal but much more commonly it carries one or more clay, shale, or pyrite partings. Both floor and roof are unsteady, rising and falling, and these alter the thickness of the bed. While the coal has been mined for railroad shipment, the main use has been for people of the surrounding country. The coal is greatly handicapped by the underlying Pittsburgh bed which is of superior quality, thicker, and more steady. The Meigs Creek coal may be considered a reserve that will be largely sought some generations hence.

Sections and analyses

Sample of Meigs Creek coal taken in 1907 by B. A. Eisenlohr from land of Joshua Kirk, one mile east of New Athens, Section 35, Athens Township, Harrison County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, unmeasured.			
Coal, sampled	*Meigs Creek*		11
Shale, sampled			¼
Coal, sampled		1	10
Shale, sampled			¼
Coal, sampled		1	5
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	5.35	0.00
Volatile matter	33.09	34.96
Fixed carbon	51.27	54.17
Ash	10.29	10.87
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.67	72.55
Hydrogen	5.21	4.88
Oxygen	12.38	8.06
Nitrogen	1.25	1.32
Sulphur	2.20	2.32
Ash	10.29	10.87
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,885	7,274
	B. t. u.	12,393	13,093

Sample of Meigs Creek coal taken in 1906 by W. T. Griswold from L. M. Dunlap mine, two miles west of Flushing, southeast quarter of Section 33, Flushing Township, Harrison County.[1]

[1]United States Bureau of Mines, Bull. 22, pp. 145, 666–667.

		Ft.	In.
Clay, roof.			
Coal, sampled	Meigs Creek		7
Coal smut, excluded	Meigs Creek		½
Coal, sampled	Meigs Creek	4	0

Proximate analysis

	As received	Moisture free
Moisture	5.51	0.00
Volatile matter	35.95	38.05
Fixed carbon	49.89	52.80
Ash	8.65	9.15
	100.00	100.00
Sulphur	2.31	2.44

Air drying loss 2.4 per cent

Sample of Meigs Creek coal taken in 1907 by B. A. Eisenlohr from mine of Flushing Coal Co., at Flushing, east central Section 26, Flushing Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, siliceous		1	4
Coal, rejected	Meigs Creek		1
Coal, sampled	Meigs Creek	3	9
Sandstone, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.98	0.00
Volatile matter	33.30	35.05
Fixed carbon	48.90	51.46
Ash	12.82	13.49
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.31	69.79
Hydrogen	4.95	4.63
Oxygen	12.32	8.31
Nitrogen	1.19	1.25
Sulphur	2.41	2.53
Ash	12.82	13.49
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,652	7,001
	B. t. u.	11,974	12,602

Sample of Meigs Creek coal taken in 1906 by W. T. Griswold from White mine, one mile southeast of Flushing, Flushing Township, Belmont County. The approximate section is as follows:[1]

[1]United States Bureau of Mines, Bull. 22, pp. 145, 664.

	Ft.	In.
Shale.		
Coal, sampled, *Meigs Creek*	4	0
Clay.		

Proximate analysis

	As received	Moisture free
Moisture	4.63	0.00
Volatile matter	33.84	35.48
Fixed carbon	52.50	55.05
Ash	9.03	9.47
	100.00	100.00
Sulphur	2.18	2.29

Sample of Meigs Creek coal taken in 1907 by B. A. Eisenlohr from Malcolm McCracken farm, northeast quarter of Section 20, Wheeling Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal with thin partings, sampled	*Meigs Creek*	4	2
Coal, below water, not sampled			7

Proximate analysis

	As received	Moisture free
Moisture*	7.52	0.00
Volatile matter	31.75	34.33
Fixed carbon	49.49	53.52
Ash	11.24	12.15
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.41	71.81
Hydrogen	5.14	4.65
Oxygen	13.99	7.90
Nitrogen	1.11	1.21
Sulphur	2.11	2.28
Ash	11.24	12.15
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,589	7,125
	B. t. u.	11,860	12,824

*Sample wet. Moisture probably 2 or 3 per cent high.

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of Andrew Kanaha, south central Section 27, Pease Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, soft.			
Coal, bony, rejected	*Meigs Creek*		3
Coal, good, sampled		1	$\frac{1}{2}$
Shale, dark, soft, sampled			$\frac{3}{16}$
Coal, good, sampled		1	$1\frac{1}{2}$
Shale, gray, soft.			

Proximate analysis

	As received	Moisture free
Moisture	4.65	0.00
Volatile matter	36.19	37.95
Fixed carbon	42.97	45.07
Ash	16.19	16.98
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	62.63	65.68
Hydrogen	4.72	4.41
Oxygen	12.07	8.33
Nitrogen	1.26	1.32
Sulphur	3.13	3.28
Ash	16.19	16.98
	100.00	100.00

Air drying loss 1.87 per cent

		As received	Moisture free
Heating value	Calories	6,265	6,571
	B. t. u.	11,278	11,828

Fusion of ash	Incipient	2,300°F.
	Complete	2,374°F.

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of O. C. Ward, northwest quarter of Section 30, Pultney Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Limestone.			
Shale, gray		4	0
Shale, dark			3
Coal, bony, rejected	*Meigs Creek*		2
Coal, good, sampled			8½
Shale, dark, hard, rejected			¼
Coal, good, sampled			7½
Shale, hard, rejected			¼
Coal, good, sampled			6
Shale, gray, hard, rejected			¼
Coal, good, sampled		1	4½
Shale, gray.			

Proximate analysis

	As received	Moisture free
Moisture	4.13	0.00
Volatile matter	39.58	41.29
Fixed carbon	42.47	44.30
Ash	13.82	14.41
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.61	68.44
Hydrogen	5.03	4.77
Oxygen	10.95	7.60
Nitrogen	1.21	1.26
Sulphur	3.38	3.52
Ash	13.82	14.41
	100.00	100.00

Air drying loss 1.79 per cent

		As received	Moisture free
Heating value	Calories	6,584	6,868
	B. t. u.	11,852	12,363
Fusion of ash	Incipient	2,170°F.	
	Complete	2,270°F.	

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of Frank Greenwood, south side of Pinch Run, central Section 28, Pultney Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, soft.			
Coal, bony, with pyrite bands, rejected	*Meigs Creek*		2
Coal, good, sampled			7½
Shale, dark, sampled			¼
Coal, good, sampled			11
Pyrite, rejected			¼
Coal, good, sampled			2
Pyrite, rejected			½
Coal, good, sampled			9½
Shale, dark, hard, rejected			1
Coal, left for floor on account of wate			

Proximate analysis

	As received	Moisture free
Moisture	3.88	0.00
Volatile matter	38.84	40.41
Fixed carbon	43.96	45.73
Ash	13.32	13.86
	100.00	100.00
Sulphur	2.71	2.82

Air drying loss 1.9 per cent

Heating value	Calories	6,643	6,911
	B. t. u.	11,958	12,441
Fusion of ash	Incipient	2,285°F.	
	Complete	2,360°F.	

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of Lewis Dyrdek, southeast Section 32, Richland Township, Belmont County. Analysis by D. J. Demorest.

	Ft.	In.
Limestone.		
Shale, gray, soft	3	0
Shale, dark, coaly		1½

		Ft.	In.
Coal, good, sampled			11
Pyrite, sampled			$\frac{1}{16}$
Coal, good, sampled			$6\frac{1}{2}$
Shale, dark, sampled			$\frac{3}{16}$
Coal, good, sampled	*Meigs Creek*	1	3
Shale, gray, rejected			2
Coal, good, sampled			9
Coal, good, not taken, on account of water, not sampled			10

Proximate analysis

	As received	Moisture free
Moisture	4.67	0.00
Volatile matter	39.86	41.81
Fixed carbon	43.26	45.38
Ash	12.21	12.81
	100.00	100.00
Sulphur	3.36	3.52
Air drying loss 2.3 per cent		
Heating value — Calories	6,672	6,999
Heating value — B. t. u.	12,010	12,598
Fusion of ash — Incipient	2,285°F.	
Fusion of ash — Complete	2,360°F.	

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from mine of Mike Premilovich, south central Section 18, Richland Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Limestone.			
Shale, gray, soft		3	0
Coal, good, sampled		1	1
Shale, coaly, sampled			$\frac{3}{8}$
Coal, good, sampled		2	3
Shale, gray, rejected	*Meigs Creek*		$\frac{1}{2}$
Coal, good, sampled			1
Coal, left for floor, not taken because of water			6

Proximate analysis

	As received	Moisture free
Moisture	5.51	0.00
Volatile matter	38.18	40.41
Fixed carbon	44.01	46.57
Ash	12.30	13.02
	100.00	100.00

		As received	Moisture free
Sulphur		2.60	2.75
Air drying loss 3.15 per cent			
Heating value	Calories	6,642	7,029
	B. t. u.	11,956	12,653
Fusion of ash	Incipient	2,300°F.	
	Complete	2,374°F.	

Sample of Meigs Creek coal taken in 1907 by B. A. Eisenlohr from mine of William Lodge on the Dunbar farm at Laferty, northwest Section 6, Union Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, impure, rejected	*Meigs Creek*		4
Clay shale, rejected		1	3
Coal, sampled		1	1½
Shale, sampled			⅜
Coal, sampled		1	2½
Shale, sampled			¼
Coal, sampled		1	9½
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	4.31	0.00
Volatile matter	32.47	33.93
Fixed carbon	51.54	53.86
Ash	11.68	12.21
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.32	71.40
Hydrogen	5.09	4.82
Oxygen	11.86	8.39
Nitrogen	1.11	1.15
Sulphur	1.94	2.03
Ash	11.68	12.21
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,837	7,145
	B. t. u.	12,307	12,861

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from mine of J. S. Calbert, southeast quarter of Section 25, Union Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale		1	6
Pyrite			⅛
Coal, bony, rejected	*Meigs Creek*		2
Coal, sampled			7
Pyrite, sampled			¼
Coal, sampled		3	9
Shale, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.17	0.00
Volatile matter	35.09	36.62
Fixed carbon	51.14	53.36
Ash	9.60	10.02
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.90	72.94
Hydrogen	4.97	4.70
Oxygen	11.33	7.96
Nitrogen	1.09	1.14
Sulphur	3.11	3.24
Ash	9.60	10.02
	100.00	100.00

Moisture in air-dried sample about 2 per cent

Heating value			
	Calories	7,001	7,306
	B. t. u.	12,602	13,150

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from land of Rev. Thomas H. Armstrong, southeast quarter of Section 5, Smith Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, rejected.			
Coal, not mined, rejected			6
Coal, sampled		1	9½
Shale, sampled			⅜
Coal, sampled	*Meigs Creek*		6
Shale, sampled			¼
Coal, sampled		1	0
Coal with pyrite, rejected			½

Proximate analysis

	As received	Moisture free
Moisture	3.52	0.00
Volatile matter	34.74	36.01
Fixed carbon	49.90	51.72
Ash	11.84	12.27
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.36	69.82
Hydrogen	5.02	4.80
Oxygen	11.06	8.22
Nitrogen	1.05	1.09
Sulphur	3.67	3.80
Ash	11.84	12.27
	100.00	100.00

Moisture in air-dried sample about 2 per cent

Heating value		As received	Moisture free
	Calories	6,884	7,135
	B. t. u.	12,391	12,843

Sample of Meigs Creek coal taken in 1906 by W. T. Griswold from Badgertown mine, one mile northwest of Bethesda, west central Section 24, Goshen Township, Belmont County.[1]

[1]United States Bureau of Mines, Bull. 22, pp. 145, 663-4.

		Ft.	In.
Coal, sampled	*Meigs Creek*	2	9½
Shale, excluded			1
Coal, sampled		2	4

Proximate analysis

	As received	Moisture free
Moisture	4.23	0.00
Volatile matter	36.41	38.02
Fixed carbon	47.91	50.02
Ash	11.45	11.96
	100.00	100.00
Sulphur	3.16	3.30

Air drying loss 1.8 per cent

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from the W. L. Statler mine, southeast quarter of Section 31, Goshen Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale.			
Coal, bony, rejected	*Meigs Creek*		1
Coal, sampled		2	7½
Shale and coal, rejected			4
Coal, sampled		1	5
Sandstone.			

Proximate analysis

	As received	Moisture free
Moisture	3.40	0.00
Volatile matter	35.72	36.98
Fixed carbon	45.94	47.56
Ash	14.94	15.46
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.77	67.05
Hydrogen	4.86	4.64
Oxygen	9.96	7.19
Nitrogen	1.08	1.12
Sulphur	4.39	4.54
Ash	14.94	15.46
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,578	6,809
	B. t. u.	11,840	12,256

Sample of Meigs Creek coal taken in 1914 by D. D. Condit from Thomas Davy mine, one mile southwest of Barnesville, northwest Section 20, Warren Township, Belmont County.[1]

[1]United States Geological Survey, Bull. 621, pp. 262, 332; Bureau of Mines, Bull. 123, pp. 65, 264–265.

		Ft.	In.
Clay, roof.			
Coal, impure, excluded	Meigs Creek		10
Clay, excluded		1	2
Coal, sampled		3	2
Coal, bony, excluded			2
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.34	0.00
Volatile matter	38.95	40.72
Fixed carbon	45.50	47.56
Ash	11.21	11.72
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.17	71.26
Hydrogen	5.31	5.05
Oxygen	10.46	6.90
Nitrogen	1.20	1.25
Sulphur	3.65	3.82
Ash	11.21	11.72
	100.00	100.00

Air drying loss 2.4 per cent

		As received	Moisture free
Heating value	Calories	6,890	7,203
	B. t. u.	12,402	12,965

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from the R. E. Malden mine, at Barnesville, northwest quarter Section 16, Warren Township, Belmont County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal and shale, roof	Meigs Creek	1	0
Shale		1	10
Coal, sampled			7½
Pyrite, sampled			1/16
Coal, sampled			11½
Shale, black, sampled			¼
Coal, sampled		2	1½
Clay, unmeasured.			

Proximate analysis

	As received	Moisture free
Moisture	4.47	0.00
Volatile matter	35.31	36.96
Fixed carbon	47.15	49.36
Ash	13.07	13.68
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.83	68.91
Hydrogen	4.99	4.71
Oxygen	11.71	8.10
Nitrogen	1.13	1.18
Sulphur	3.27	3.42
Ash	13.07	13.68
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,668	6,980
	B. t. u.	12,002	12,564

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of Wm. P. Brown, near Steinersville, west central Section 8, York Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Limestone.			
Shale, gray, soft		3	0
Shale, dark, soft			5
Coal, good, sampled	*Meigs Creek*		6
Shale, gray, hard, rejected			$\frac{3}{8}$
Coal, good, sampled			$6\frac{1}{2}$
Pyrite, sampled			$\frac{1}{16}$
Coal, good, sampled			11
Shale, dark, rejected			$\frac{1}{4}$
Coal, good, sampled			$4\frac{1}{2}$
Shale, gray.			

Proximate analysis

	As received	Moisture free
Moisture	3.26	0.00
Volatile matter	40.94	42.32
Fixed carbon	44.82	46.34
Ash	10.98	11.34
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	69.07	71.39
Hydrogen	5.06	4.86
Oxygen	9.84	7.18
Nitrogen	1.19	1.23
Sulphur	3.86	4.00
Ash	10.98	11.34
	100.00	100.00

Air drying loss 1.04 per cent

		As received	Moisture free
Heating value	Calories	6,946	7,180
	B. t. u.	12,502	12,923
Fusion of ash	Incipient	2,228°F.	
	Complete	2,345°F.	

Sample of Meigs Creek coal taken in 1914 by D. D. Condit from mine of Shipman Brothers, about one mile north of Alledonia in north central Section 22, Washington Township, Belmont County.[1]

		Ft.	In.
Clay and limestone, roof.			
Coal, sampled	*Meigs Creek*	2	1
Coal, bony, cannel, sampled			$2\frac{1}{2}$
Coal, sampled			$1\frac{1}{2}$
Clay, excluded			$\frac{1}{2}$
Coal, sampled		1	6
Clay shale, floor.			

[1]United States Geological Survey, Bull. 621, pp. 263, 333; Bureau of Mines, Bull. 123, pp. 64, 263.

Proximate analysis

	As received	Moisture free
Moisture	3.51	0.00
Volatile matter	37.15	38.50
Fixed carbon	41.53	43.04
Ash	17.81	18.46
	100.00	100.00
Sulphur	4.05	4.20
Air drying loss 1.6 per cent		
Heating value, Calories	6,396	6,629
Heating value, B. t. u.	11,513	11,932

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from strip mine of Nick Lucas, in bed of North Fork, northwest quarter of Section 10, Wayne Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Surface of ground.			
Alluvium		6	0
Coal, bony, rejected	*Meigs Creek*		2
Coal, good, sampled			7
Shale, dark, sampled			1/8
Coal, good, sampled			11 1/2
Shale, dark, with coaly bands, rejected			1/2
Coal, good, sampled			5
Shale, sampled			1/8
Coal, good, sampled			8 1/2
Clay shale		1	6

Water level, North Fork of Captina Creek.

Entire thickness of coal probably present.

Proximate analysis

	As received	Moisture free
Moisture	4.21	0.00
Volatile matter	39.51	41.25
Fixed carbon	43.86	45.78
Ash	12.42	12.97
	100.00	100.00
Sulphur	2.81	2.94
Air drying loss 2.04 per cent		
Heating value, Calories	6,786	7,084
Heating value, B. t. u.	12,214	12,751
Fusion of ash, Incipient	2,330°F.	
Fusion of ash, Complete	2,430°F.	

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from shaft mine of J. W. Dillon, northwest quarter of Section 15, Perry Township, Monroe County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, hard.			
Coal, good, sampled	*Meigs Creek*	1	2½
Shale, hard, dark, rejected			2½
Coal, with pyrite, rejected			1
Pyrite, rejected			½
Coal, good, sampled		2	7
Shale, gray.			

Proximate analysis

	As received	Moisture free
Moisture	2.32	0.00
Volatile matter	39.30	40.23
Fixed carbon	43.84	44.89
Ash	14.54	14.88
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.78	68.37
Hydrogen	4.93	4.78
Oxygen	9.21	7.32
Nitrogen	0.95	0.97
Sulphur	3.59	3.68
Ash	14.54	14.88
	100.00	100.00

Air drying loss 0.00 per cent

		As received	Moisture free
Heating value	Calories	6,759	6,920
	B. t. u.	12,167	12,456

Fusion of ash	Incipient	2,330°F.
	Complete	2,444°F.

Sample of Meigs Creek coal taken in 1914 by D. D. Condit from mine of G. W. Griffin, three miles southeast of Quaker City Station, Section 11, Beaver Township, Noble County.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled	*Meigs Creek*	2	5
Clay, excluded			2
Coal, sampled		1	2
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.14	0.00
Volatile matter	38.42	40.08
Fixed carbon	44.82	46.75
Ash	12.62	13.17
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.87	69.76
Hydrogen	5.22	4.97
Oxygen	10.48	7.08
Nitrogen	1.20	1.25
Sulphur	3.61	3.77
Ash	12.62	13.17
	100.00	100.00

Air drying loss 2.1 per cent

[1]United States Geological Survey, Bull. 621, pp. 266, 335; Bureau of Mines, Bull. 123, pp. 66, 270.

		As received	Moisture free
Heating value	Calories	6,739	7,030
	B. t. u.	12,130	12,654

Sample of Meigs Creek coal taken in 1914 by D. D. Condit from mine of Wiley Carter, one mile north of Mt. Ephriam Station, Section 33, Seneca Township, Noble County.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled	*Meigs Creek*		11
Mother coal, excluded			¾
Coal, sampled			10
Mother coal, excluded			1
Coal, sampled		1	4
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.53	0.00
Volatile matter	39.56	41.44
Fixed carbon	45.59	47.75
Ash	10.32	10.81
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.00	71.22
Hydrogen	5.27	5.00
Oxygen	11.12	7.42
Nitrogen	1.17	1.23
Sulphur	4.12	4.32
Ash	10.32	10.81
	100.00	100.00

Air drying loss 2.4 per cent

		As received	Moisture free
Heating value	Calories	6,846	7,171
	B. t. u.	12,323	12,908

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde on C. T. Hague farm, about one and one-half miles northwest of Summerfield, southeast quarter of Section 12, Marion Township, Noble County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale.			
Coal, sampled	*Meigs Creek*		9¼
Shale, sampled			¼
Coal, sampled		1	11
Shale and pyrite, sampled			¼
Coal with 3 pyrite streaks, sampled		1	1
Coal, not sampled			2
Coal, shaly, not mined			6

[1]United States Geological Survey, Bull. 621, pp. 266, 335; Bureau of Mines, Bull. 123, pp. 66, 270.

Proximate analysis

	As received	Moisture free
Moisture	3.12	0.00
Volatile matter	37.36	38.56
Fixed carbon	46.67	48.18
Ash	12.85	13.26
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.61	67.72
Hydrogen	5.09	4.90
Oxygen	9.93	7.39
Nitrogen	0.92	0.95
Sulphur	5.60	5.78
Ash	12.85	13.26
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,739	6,956
	B. t. u.	12,130	12,521

Sample of Meigs Creek coal taken in 1914 by D. D. Condit from mine of J. T. Moore, one mile west of Steamtown Station, northeast Section 11, Marion Township, Noble County.[1]

		Ft.	In.
Clay, roof.			
Coal, sampled	*Meigs Creek*		11
Mother coal, excluded			½
Coal, sampled		2	0
Mother coal, excluded			1
Coal, sampled		1	0
Clay shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	3.57	0.00
Volatile matter	41.53	43.07
Fixed carbon	44.37	46.01
Ash	10.53	10.92
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.15	70.67
Hydrogen	5.25	5.03
Oxygen	10.09	7.18
Nitrogen	1.11	1.15
Sulphur	4.87	5.05
Ash	10.53	10.92
	100.00	100.00

Air drying loss 1.9 per cent

		As received	Moisture free
Heating value	Calories	6,947	7,204
	B. t. u.	12,505	12,967

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of C. F. Young, east central part of Section 17, Center Township, Noble County. Analysis by D. J. Demorest.

[1]United States Geological Survey, Bull. 621, pp. 267, 335; Bureau of Mines, Bull. 123, pp. 66, 270–1.

		Ft.	In.
Shale, gray, hard.			
Coal, bony, left for roof, rejected	*Meigs Creek*		7
Shale, gray, hard, rejected			5½
Coal, bony, rejected			4½
Coal, good, sampled		1	11
Pyrite, rejected			½
Coal, bony, rejected			2
Shale, dark, rejected			¾
Coal, good, sampled			8
Coal, bony, with pyrite, rejected			1
Shale, gray, clayey.			

Proximate analysis

	As received	Moisture free
Moisture	4.62	0.00
Volatile matter	41.13	43.12
Fixed carbon	44.01	46.14
Ash	10.24	10.74
	100.00	100.00
Sulphur	4.17	4.37
Air drying loss 1.89 per cent		
Heating value — Calories	6,791	7,120
Heating value — B. t. u.	12,224	12,816
Fusion of ash — Incipient	2,416°F.	
Fusion of ash — Complete	2,486°F.	

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from farm of J. M. Pickenpaugh, northeast quarter of Section 35, Brookfield Township, Noble County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal with two shale partings, sampled	*Meigs Creek*		10
Coal, sampled		1	5
Coal with numerous pyrite and shale partings, excluded			3
Coal with 3 shale and 3 pyrite partings, sampled		2	3

Proximate analysis

	As received	Moisture free
Moisture	3.54	0.00
Volatile matter	37.41	38.78
Fixed carbon	45.82	47.50
Ash	13.23	13.72
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.44	66.80
Hydrogen	5.12	4.90
Oxygen	10.12	7.23
Nitrogen	0.88	0.91
Sulphur	6.21	6.44
Ash	13.23	13.72
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,642	6,886
	B. t. u.	11,956	12,395

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from bank of H. C. Hunter, northwest quarter of Section 4, Brookfield Township, Noble County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, bony, excluded	*Meigs Creek*		5½
Shale, excluded			¾
Coal, sampled			8½
Shale parting with pyrite, sampled			¼
Coal, sampled		1	3½
Coal, shaly, excluded			1½
Coal, with two thin smut bands, sampled			10½
Pyrite, quite persistent, sampled			⅛
Coal, hard, sampled			4½
Coal in floor, not mined			9½

Proximate analysis

	As received	Moisture free
Moisture*	4.85	0.00
Volatile matter	37.28	39.18
Fixed carbon	48.05	50.50
Ash	9.82	10.32
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.01	69.37
Hydrogen	5.26	4.96
Oxygen	12.35	8.47
Nitrogen	0.97	1.01
Sulphur	5.59	5.87
Ash	9.82	10.32
	100.00	100.00

*Sample slightly wet. Moisture possibly 1 per cent high.

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,834	7,182
	B. t. u.	12,301	12,928

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of George Amos, operated by Anderson and Wehr, central Section 25, Stock Township, Noble County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, hard.			
Coal, good, sampled	*Meigs Creek*		11
Shale, dark, rejected			1½
Coal, good, sampled		1	6
Coal, bony, rejected			5
Coal, good, sampled		1	9
Coal, good, not mined on account of water. Not sampled			3
Shale, soft, gray.			

Proximate analysis

	As received	Moisture free
Moisture	4.08	0.00
Volatile matter	43.49	45.34
Fixed carbon	41.56	43.33
Ash	10.87	11.33
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.70	69.54
Hydrogen	5.19	4.95
Oxygen	10.83	7.50
Nitrogen	1.02	1.06
Sulphur	5.39	5.62
Ash	10.87	11.33
	100.00	100.00

Air drying loss 1.82 per cent

		As received	Moisture free
Heating value	Calories	6,831	7,122
	B. t. u.	12,296	12,820

Fusion of ash	Incipient	2,360°F.
	Complete	2,444°F.

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from farm of Uriah Cleary, northwest quarter of Section 25, Stock Township, Noble County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, unmeasured.			
Coal, with two thin partings of pyrite, sampled	*Meigs Creek*		9½
Parting: Smut band, sampled			⅛
Parting: Coal, sampled			⅜
Parting: Smut band, sampled			⅜
Coal, with thin layer of pyrite, sampled		1	7
Coal, bony, rejected			1¼
Coal, sampled		1	3½
Coal, impure, rejected			3

Proximate analysis

	As received	Moisture free
Moisture	2.55	0.00
Volatile matter	38.40	39.40
Fixed carbon	47.64	48.89
Ash	11.41	11.71
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	57.50	69.26
Hydrogen	5.11	4.96
Oxygen	9.27	7.19
Nitrogen	0.92	0.94
Sulphur	5.79	5.94
Ash	11.41	11.71
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,952	7,134
	B. t. u.	12,514	12,841

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of Henry Snyder, southeast quarter of Section 4, Enoch Township, Noble County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray.			
Coal, bony, rejected	*Meigs Creek*		6
Shale, rejected			½
Coal, bony, rejected			7
Shale, hard, dark, with pyrite, rejected			3
Coal, good, sampled		2	7
Shale, with coaly bands.			

Proximate analysis

	As received	Moisture free
Moisture	3.86	0.00
Volatile matter	44.91	46.71
Fixed carbon	39.62	41.21
Ash	11.61	12.08
	100.00	100.00
Sulphur	5.35	5.56
Air drying loss 1.75 per cent		
Heating value—Calories	6,836	7,110
Heating value—B. t. u.	12,304	12,799
Fusion of ash—Incipient	2,444°F.	
Fusion of ash—Complete	2,500°F.	

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from land of Mrs. Catherine A. Dillehay, one mile north of Dexter City, Section 31, Enoch Township, Noble County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, sampled	*Meigs Creek*		3½
Shale, sampled			¼
Coal, with two pyrite lamella, sampled		1	6
Coal, pyrite, shale, and smut, rejected			9½
Coal, with two thin pyrite bands, sampled		1	4¾
Coal, in floor, rejected			2½

Proximate analysis

	As received	Moisture free
Moisture*	2.90	0.00
Volatile matter	37.24	38.35
Fixed carbon	49.70	51.19
Ash	10.16	10.46
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.53	70.58
Hydrogen	5.22	5.05
Oxygen	10.78	8.44
Nitrogen	1.04	1.07
Sulphur	4.27	4.40
Ash	10.16	10.46
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	7,051	7,261
	B. t. u.	12,690	13,069

*Sample very wet and was dried in sun for one-half hour. Moisture probably about 1 per cent lower than as mined.

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from mine of C. I. McKee, operated by Arthur McKee, Dudley, central Section 13, Olive Township, Noble County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, hard.			
Coal, good, sampled	*Meigs Creek*		9½
Shale, dark, rejected, usually with pyrite			½
Coal, good, sampled			½
Coal, good, cannelloid, sampled		1	6
Coal, good, sampled			3
Pyrite, sampled			4
Coal, good, sampled			1/16
Coal, shaly, sampled			7
Coal, good, sampled			¼
Clay shale, gray.		1	2

Proximate analysis

	As received	Moisture free
Moisture	4.36	0.00
Volatile matter	41.06	42.93
Fixed carbon	41.26	43.14
Ash	13.32	13.93
	100.00	100.00
Sulphur	4.73	4.95

Air drying loss 1.89 per cent

Heating value	Calories	6,574	6,874
	B. t. u.	11,833	12,372
Fusion of ash	Incipient	2,116°F.	
	Complete	2,210°F.	

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from farm of G. W. Love on Snaler Run, east central Section 13, northeastern part of Elk Township, Noble County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, sampled	*Meigs Creek*	1	8
Shale with pyrite, sampled			¼
Coal, with smut bands near top, sampled		3	2
Pyrite, rejected			⅛

Proximate analysis

	As received	Moisture free
Moisture	3.06	0.00
Volatile matter	38.43	39.64
Fixed carbon	46.18	47.64
Ash	12.33	12.72
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.18	68.27
Hydrogen	5.11	4.92
Oxygen	9.52	7.01
Nitrogen	0.86	0.89
Sulphur	6.00	6.19
Ash	12.33	12.72
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,865	7,082
	B. t. u.	12,357	12,747

Sample of Meigs Creek coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of Oscar Waller, northwestern part of Section 5, Jackson Township, Noble County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, hard, dark:			
Coal, bony, rejected	*Meigs Creek*		3½
Coal, good, sampled			11
Mother coal, with thin pyrite bands, rejected			¾
Coal, good, sampled		2	1
Coal, bony, rejected			4
Shale, soft.			

Proximate analysis

	As received	Moisture free
Moisture	4.52	0.00
Volatile matter	42.16	44.16
Fixed carbon	41.26	43.21
Ash	12.06	12.63
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.08	69.21
Hydrogen	5.12	4.84
Oxygen	11.32	7.65
Nitrogen	0.88	0.92
Sulphur	4.54	4.75
Ash	12.06	12.63
	100.00	100.00

Air drying loss 2.06 per cent

		As received	Moisture free
Heating value	Calories	6,722	7,040
	B. t. u.	12,099	12,672

Fusion of ash	Incipient	2,360°F.
	Complete	2,444°F.

Sample of Meigs Creek coal taken in 1917 by W. Stout and R. E. Lamborn from property of Rosa Young, north central Section 35, Bluerock Township, Muskingum County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, hard, dark		1	0
Coal, bony, excluded	*Meigs Creek*		1½
Coal, good, sampled		1	0
Pyrite, irregular, rejected			½
Coal, good, sampled			7½
Shale, rejected			½
Coal, good, sampled		2	1
Clay, calcareous		2	0

Proximate analysis

	As received	Moisture free
Moisture	5.16	0.00
Volatile matter	40.12	42.30
Fixed carbon	41.58	43.84
Ash	13.14	13.86
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.25	66.69
Hydrogen	5.22	4.90
Oxygen	12.46	8.31
Nitrogen	0.86	0.90
Sulphur	5.07	5.34
Ash	13.14	13.86
	100.00	100.00

Air drying loss 2.0 per cent

		As received	Moisture free
Heating value	Calories	6,429	6,779
	B. t. u.	11,572	12,202

Fusion of ash	Incipient	2,057°F.
	Complete	2,275°F.

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from mine of Louis Grandstaff, southwest quarter of Section 29, Manchester Township, Morgan County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, reported thickness		15	0
Coal, not mined, rejected	*Meigs Creek*		8
Coal, sampled		1	2
Pyrite, sampled			⅛
Coal, sampled		1	¼
Coal, bony, with shale and pyrite, sampled			4½
Coal, sampled		1	0
Pyrite, sampled			¼
Coal, sampled			8½

Proximate analysis

	As received	Moisture free
Moisture	4.07	0.00
Volatile matter	37.61	39.21
Fixed carbon	47.66	49.68
Ash	10.66	11.11
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	66.19	69.00
Hydrogen	5.10	4.84
Oxygen	12.11	8.85
Nitrogen	0.87	0.91
Sulphur	5.07	5.29
Ash	10.66	11.11
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,779	7,067
	B. t. u.	12,202	12,720

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from mine on D. C. Lawrence farm, northeast quarter of Section 21, Bristol Township, Morgan County. Analysis by Lord and Somermeier.

		Ft.	In.
Shale, roof.			
Coal, thin.			
Shale, 1 to 2 inches.			
Coal, sampled	*Meigs Creek*	1	7¼
Shale, sampled			¼
Coal, sampled			2¼
Shale, rejected			1
Coal, sampled		2	0

Proximate analysis

	As received	Moisture free
Moisture*	5.05	0.00
Volatile matter	37.83	39.84
Fixed carbon	46.75	49.24
Ash	10.37	10.92
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	67.04	70.61
Hydrogen	5.14	4.82
Oxygen	12.26	8.18
Nitrogen	0.89	0.94
Sulphur	4.30	4.53
Ash	10.37	10.92
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,730	7,088
	B. t. u.	12,114	12,758

*Sample slightly wet. Moisture possibly one per cent high.

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from land of F. S. Murray, northeast quarter of Section 1, Meigsville Township, Morgan County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, unmeasured.			
Coal, usually about 5 inches, sampled	*Meigs Creek*		1¾
Shale, rejected			¾
Coal, smut streak near middle, sampled		1	2
Coal, bony, rejected			4
Coal, sampled			8
Pyrite, sampled			⅛
Coal, sampled			1
Pyrite, sampled			¼
Coal, sampled		1	1

Proximate analysis

	As received	Moisture free
Moisture	5.13	0.00
Volatile matter	36.07	38.02
Fixed carbon	47.06	49.60
Ash	11.74	12.38
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.77	68.27
Hydrogen	5.06	4.73
Oxygen	12.67	8.55
Nitrogen	0.87	0.92
Sulphur	4.89	5.15
Ash	11.74	12.38
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,625	6,983
	B. t. u.	11,925	12,569

Sample of Meigs Creek coal taken in 1904 by J. E. Hyde from mine of Felix Coal Co., A. L. Mason, lessee, located one-half mile below village of Coal Run, west central Adams Township, Washington County. Analysis by Lord and Somermeier.

		Ft.	In.
Clay shale, unmeasured.			
Coal, sampled	*Meigs Creek*		6
Smut, sometimes has pyrite and shale, sampled			⅜
Coal, including pyrite and smut, sampled		1	4
Coal, with numerous pyrite and shale partings, rejected			3¾
Coal, with two pyrite partings, sampled			11¾
Coal, forming floor in entries, rejected			4

Proximate analysis

	As received	Moisture free
Moisture	2.95	0.00
Volatile matter	37.47	38.61
Fixed carbon	46.69	48.11
Ash	12.89	13.28
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.88	67.88
Hydrogen	5.05	4.86
Oxygen	9.71	7.31
Nitrogen	0.92	0.95
Sulphur	5.55	5.72
Ash	12.89	13.28
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	6,803	7,010
	B. t. u.	12,245	12,617

Sample of Meigs Creek coal taken in 1907 by J. E. Hyde from land of Charles Schimmel, one mile southwest of Elba, northwest quarter of Section 28, Aurelius Township, Washington County. Analysis by Lord and Somermeier.

		Ft.	In.
Coal, lower part of upper bench, rejected	*Meigs Creek*		9½
Shale and clay, rejected		1	3
Coal, sampled			8¾
Shale, rejected			⅝
Coal, sampled		2	3¼

Proximate analysis

	As received	Moisture free
Moisture	3.40	0.00
Volatile matter	37.95	39.28
Fixed carbon	49.07	50.80
Ash	9.58	9.92
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	68.33	70.73
Hydrogen	5.31	5.10
Oxygen	10.85	8.11
Nitrogen	0.90	0.93
Sulphur	5.03	5.21
Ash	9.58	9.92
	100.00	100.00

Moisture in air-dried sample about 2 per cent

		As received	Moisture free
Heating value	Calories	7,083	7,332
	B. t. u.	12,749	13,198

UNIONTOWN, No. 10 COAL

The place of the Uniontown coal in the geological column is shown in sections on page 179. The bed is found high in the hills in several counties in eastern Ohio and especially in Belmont where the

coal has been worked at numerous places by farmers and is locally known as the "three-foot bed." There appears to be a large area where this coal is 2 to 3 feet thick, and in a way it constitutes a fuel reserve. When work now being done by Stout is completed and published the State will have definite information on this coal.

Sections and analyses

Sample of Uniontown coal taken in 1914 by D. D. Condit from Peter Kemp prospect, two miles east of Hunter and five miles southeast of Bethesda, Section 1, Goshen Township, Belmont County.[1]

		Ft.	In.
Clay, roof.			
Coal, sampled	*Uniontown*	2	6
Shale, excluded			1
Coal, sampled			3
Shale, excluded			5
Coal, sampled			7
Clay, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.70	0.00
Volatile matter	34.21	35.90
Fixed carbon	45.75	48.00
Ash	15.34	16.10
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.71	66.85
Hydrogen	4.95	4.65
Oxygen	11.82	8.01
Nitrogen	1.33	1.40
Sulphur	2.85	2.99
Ash	15.34	16.10
	100.00	100.00

Air drying loss 2.6 per cent

		As received	Moisture free
Heating value	Calories	6,479	6,799
	B. t. u.	11,662	12,238

Sample of Uniontown coal taken in 1926 by G. W. White, R. H. Peters, and T. R. Meyers from mine of S. D. Hatcher, northwest quarter of Section 1, Goshen Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, top.			
Coal, good, sampled	*Uniontown*	1	4¼
Shale, gray, rejected			½
Coal, poor, rejected			1¼
Clay shale, rejected			1½
Coal, good, sampled			3
Shale, dark, hard, rejected			¾
Coal, good, taken			2¾
Shale, bottom.			

[1]United States Geological Survey, Bull. 621, pp. 264, 333; Bureau of Mines, Bull. 123, pp. 65, 665.

Proximate analysis

	As received	Moisture free
Moisture	0.83	0.00
Volatile matter	41.21	41.56
Fixed carbon	44.29	44.66
Ash	13.67	13.78
	100.00	100.00
Sulphur	2.59	2.61

Air drying loss 0.0 per cent

Heating value	Calories	6,747	6,803
	B. t. u.	12,145	12,246
Fusion of ash	Incipient	2,260°F.	
	Complete	2,390°F.	

Sample of Uniontown coal taken in 1926 by G. W. White, R. H. Peters, and T. R. Meyers from wagon mine of Okey McConnell, one-half mile south of Cameron, east central Section 18, Adams Township, Monroe County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, top.			
Coal, good, sampled	*Uniontown*	1	2
Shale, gray, rejected			¾
Coal, good, sampled			6
Shale, dark, rejected			1
Coal, good, sampled			2
Coal, bony, bottom, rejected			4
Clay.			

Proximate analysis

	As received	Moisture free
Moisture	2.57	0.00
Volatile matter	40.87	41.95
Fixed carbon	42.82	43.94
Ash	13.74	14.11
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.96	67.68
Hydrogen	4.83	4.73
Oxygen	11.04	8.93
Nitrogen	1.37	1.40
Sulphur	3.06	3.15
Ash	13.74	14.11
	100.00	100.00

Air drying loss 1.98 per cent

		As received	Moisture free
Heating value	Calories	6,573	6,746
	B. t. u.	11,831	12,143
Fusion of ash	Incipient	2,044°F.	
	Complete	2,105°F.	

Sample of Uniontown coal taken in 1914 by D. D. Condit from mine of Charles Mobley, two and one-half miles east of Coats Station, Section 31, Adams Township, Monroe County.[1]

		Ft.	In.
Shale, roof.			
Coal, bony at top, sampled	*Uniontown*	1	7
Shale, excluded			3½
Coal, sampled			10½
Shale, excluded			2
Coal, sampled			6
Clay shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.85	0.00
Volatile matter	35.93	37.76
Fixed carbon	43.90	46.14
Ash	15.32	16.10
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.59	66.83
Hydrogen	4.87	4.55
Oxygen	11.07	7.11
Nitrogen	1.19	1.25
Sulphur	3.96	4.16
Ash	15.32	16.10
	100.00	100.00

Air drying loss 2.7 per cent

		As received	Moisture free
Heating value	Calories	6,412	6,739
	B. t. u.	11,542	12,130

LITTLE WAYNESBURG COAL

The Little Waynesburg coal extends with many wants across the State from Jefferson County to Meigs County. The position of the bed is 10 to 25 feet below the Waynesburg coal and 25 to 40 feet above the Uniontown member. It is everywhere thin, seldom exceeding 10 inches in thickness, and is therefore of little value as a source of fuel.

WAYNESBURG COAL

The Waynesburg or No. 12 coal is the topmost member of the Monongahela series. It is persistent in the hills of eastern Ohio in Jefferson, Belmont, Monroe, and Noble counties. The bed is at its best in southern Belmont County where it varies from 2 to 4 feet in thickness and where it has been worked by farmers. The coal is of poor quality and as a source of fuel it can never play an important part in the State.

[1]United States Geological Survey, Bull. 621, pp. 266, 334; Bureau of Mines, Bull. 123, pp. 66, 269–270.

Sections and analyses

Sample of Waynesburg coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of A. B. Shields, southwest quarter of Section 36, Colerain Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, massive.			
Sandstone, shaly			3
Coal, good, sampled	*Waynesburg*	3	1
Shale, dark, rejected			1½
Coal, good, sampled			9½
Shale, with pyrite bands, rejected			⅜
Coal, bony, rejected			2
Shale, gray, soft.			

Proximate analysis

	As received	Moisture free
Moisture	5.27	0.00
Volatile matter	37.42	39.50
Fixed carbon	42.61	44.98
Ash	14.70	15.52
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.45	68.04
Hydrogen	4.97	4.62
Oxygen	12.25	7.99
Nitrogen	1.44	1.52
Sulphur	2.19	2.31
Ash	14.70	15.52
	100.00	100.00

Air drying loss 2.3 per cent

		As received	Moisture free
Heating value	Calories	6,434	6,792
	B. t. u.	11,581	12,225

Fusion of ash	Incipient	2,583°F.
	Complete	2,635°F.

Sample of Waynesburg coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of S. J. Coldman, one and one-half miles northeast of Glencoe, east central Section 36, Richland Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone, massive.			
Shale, gray			8
Sandstone			2½
Shale, gray, soft			3½
Shale, dark, soft			2
Shale, bony			2
Coal, bony, rejected			2
Coal, good, sampled	*Waynesburg*	3	0
Shale, gray, rejected			2
Coal, bony, rejected			5
Shale, gray.			

Proximate analysis

	As received	Moisture free
Moisture	3.68	0.00
Volatile matter	37.36	38.78
Fixed carbon	45.89	47.65
Ash	13.07	13.57
	100.00	100.00
Sulphur	1.75	1.82

Air drying loss 0.00 per cent

Heating value	Calories	6,678	6,933
	B. t. u.	12,020	12,479
Fusion of ash	Incipient	2,554°F.	
	Complete	2,635°F.	

Sample of Waynesburg coal taken in 1927 by G. W. White and P. E. Fitzgerald from local mine of Charles Teiber, northwest corner of Section 33, Mead Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Sandstone.			
Shale, gray, soft		1	0
Coal, bony, rejected			1
Coal, good, sampled		2	0
Shale, dark, hard, rejected			¾
Coal, good, sampled			4½
Coal, bony, rejected	*Waynesburg*		1½
Shale, gray, soft, rejected			3
Coal, bony, rejected			5½
Shale, gray, rejected			2
Coal, bony, rejected			5
Shale, gray, soft.			

Proximate analysis

	As received	Moisture free
Moisture	3.51	0.00
Volatile matter	37.68	39.05
Fixed carbon	41.94	43.47
Ash	16.87	17.48
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	63.18	65.48
Hydrogen	4.70	4.47
Oxygen	10.41	7.56
Nitrogen	1.25	1.29
Sulphur	3.59	3 72
Ash	16.87	17.48
	100.00	100.00

Air drying loss 0.83 per cent

		As received	Moisture free
Heating value	Calories	6,320	6,550
	B. t. u.	11,377	11,791
Fusion of ash	Incipient	2,360°F.	
	Complete	2,430°F.	

Sample of Waynesburg coal taken in 1927 by G. W. White and P. E. Fitzgerald from mine of W. A. Green, southwest quarter of Section 30, Smith Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, sandy		2	0
Coal, bony, rejected	*Waynesburg*		8
Coal, sampled		1	5¼
Coal, bony, rejected			1¼
Shale, gray, rejected			¼
Coal, sampled			10
Shale, gray, with pyrite, sampled			⅛
Coal, sampled			1¼
Shale, gray, soft.			

Proximate analysis

	As received	Moisture free
Moisture	5.72	0.00
Volatile matter	35.86	38.03
Fixed carbon	44.31	47.01
Ash	14.11	14.96
	100.00	100.00
Sulphur	2.50	2.65

Air drying loss 2.5 per cent

Heating value	Calories	6,439	6,830
	B. t. u.	11,590	12,293
Fusion of ash	Incipient	2,145°F.	
	Complete	2,251°F.	

Sample of Waynesburg coal taken in 1926 by G. W. White and T. R. Meyers from G. C. Dyer mine, southwest corner of Section 16, Smith Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, roof.			
Shale, black, bony, rejected			1¾
Coal, good, taken	*Waynesburg*	2	5
Shale, black, taken			¼
Coal, good, taken		1	0
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture	1.78	0.00
Volatile matter	39.16	39.87
Fixed carbon	43.65	44.44
Ash	15.41	15.69
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.15	66.33
Hydrogen	4.87	4.75
Oxygen	10.71	9.30
Nitrogen	1.18	1.20
Sulphur	2.68	2.73
Ash	15.41	15.69
	100.00	100.00

Air drying loss 0.9 per cent

		As received	Moisture free
Heating value	Calories	6,505	6,623
	B. t. u.	11,709	11,921

Fusion of ash	Incipient	2,496°F.
	Complete	2,576°F.

Sample of Waynesburg coal taken in 1914 by D. D. Condit from Milhoan mine, one and one-half miles northeast of Hunter and five miles south of Bethesda Station, northeast Section 7, Goshen Township, Belmont County.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled	*Waynesburg*	2	1½
Coal, bony, sampled	*Waynesburg*		1½
Coal, sampled	*Waynesburg*		11
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.31	0.00
Volatile matter	35.32	36.91
Fixed carbon	44.15	46.14
Ash	16.22	16.95
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	64.10	66.98
Hydrogen	4.98	4.70
Oxygen	9.97	6.43
Nitrogen	1.20	1.25
Sulphur	3.53	3.69
Ash	16.22	16.95
	100.00	100.00

Air drying loss 2.2 per cent

		As received	Moisture free
Heating value	Calories	6,447	6,737
	B. t. u.	11,605	12,127

[1]United States Geological Survey, Bull. 621, pp. 262, 332; Bureau of Mines, Bull. 123, pp. 65, 265.

Sample of Waynesburg coal taken in 1926 by G. W. White and T. R. Meyers from prospect opening on land of A. A. and H. A. Caldwell, on Narrows Run, southeast corner of Section 17, York Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Coal, bony, rejected	*Waynesburg*		11
Coal, good, sampled		1	9½
Shale, dark, hard, sampled			¼
Coal, good, sampled			8
Coal, bony, bottom, rejected.			

Proximate analysis

	As received	Moisture free
Moisture	2.84	0.00
Volatile matter	40.07	41.24
Fixed carbon	43.75	45.03
Ash	13.34	13.73
	100.00	100.00
Sulphur	4.91	5.06

Air drying loss 2.78 per cent

Heating value	Calories	6,526	6,716
	B. t. u.	11,746	12,089
Fusion of ash	Incipient	2,390°F.	
	Complete	2,490°F.	

Sample of Waynesburg coal taken in 1914 by D. D. Condit from Stoffel mine on Nathan Davis farm, one mile southwest of Alledonia, Section 27, Washington Township, Belmont County.[1]

		Ft.	In.
Coal, bony, rejected	*Waynesburg*		4
Coal, sampled		2	5½

Proximate analysis

	As received	Moisture free
Moisture	4.57	0.00
Volatile matter	36.81	38.57
Fixed carbon	44.17	46.29
Ash	14.45	15.14
	100.00	100.00
Sulphur	2.59	2.71

Air drying loss 2.4 per cent

[1]United States Geological Survey, Bull. 621, pp. 263, 333; Bureau of Mines, Bull. 123, pp. 65, 264.

		As received	Moisture free
Heating value.....	Calories	6,574	6,889
	B. t. u.	11,833	12,400

Sample of Waynesburg coal taken in 1926 by G. W. White and T. R. Meyers from W. E. Moore mine on Long Run, southwest Section 3, Wayne Township, Belmont County. Analysis by D. J. Demorest.

		Ft.	In.
Shale, gray, roof.			
Coal, good, sampled.....	*Waynesburg*	2	0
Shale, dark, hard, rejected.....			1
Coal, good, sampled.....			9
Clay, bottom.			

Proximate analysis

	As received	Moisture free
Moisture.....	5.59	0.00
Volatile matter.....	38.38	40.66
Fixed carbon.....	39.70	42.05
Ash.....	16.33	17.29
	100.00	100.00
Sulphur.....	3.20	3.39
Air drying loss 4.9 per cent		
Heating value..... Calories	6,110	6,472
Heating value..... B. t. u.	10,999	11,650
Fusion of ash..... Incipient	2,496°F.	
Fusion of ash..... Complete	2,592°F.	

Sample of Waynesburg coal taken in 1914 by D. D. Condit from drift mine of Howard Brown, two miles southeast of Somerton and eight miles southeast of Barnesville, Section 26, Wayne Township, Belmont County.[1]

		Ft.	In.
Shale, roof.			
Coal, sampled.....	*Waynesburg*	1	6
Pyrite, excluded.....			1
Coal, sampled.....			0
Mother coal, excluded.....			½
Coal, sampled.....			11
Clay shale, floor.			

[1]United States Geological Survey, Bull. 621, pp. 263, 333; Bureau of Mines, Bull. 123, pp. 65, 266.

Proximate analysis

	As received	Moisture free
Moisture	4.40	0.00
Volatile matter	37.10	38.81
Fixed carbon	43.06	45.04
Ash	15.44	16.15
	100.00	100.00
Sulphur	2.90	3.03

Air drying loss 2.3 per cent

		As received	Moisture free
Heating value	Calories	6,476	6,774
	B. t. u.	11,657	12,193

Sample of Waynesburg coal taken in 1914 by D. D. Condit from George Thomas mine, two miles east of Boston (Atlas P. O.) and seven miles south of Barnesville, Section 14, Somerset Township, Belmont County.[1]

		Ft.	In.
Sandstone, roof.			
Coal, sampled	*Waynesburg*	1	0
Pyrite, excluded			2
Coal, sampled			10
Mother coal, excluded			1
Coal, sampled			11
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.46	0.00
Volatile matter	36.60	38.31
Fixed carbon	44.19	46.25
Ash	14.75	15.44
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	65.32	68.37
Hydrogen	5.10	4.81
Oxygen	10.65	7.01
Nitrogen	1.16	1.21
Sulphur	3.02	3.16
Ash	14.75	15.44
	100.00	100.00

Air drying loss 2.5 per cent

		As received	Moisture free
Heating value	Calories	6,553	6,859
	B. t. u.	11,795	12,346

[1]United States Geological Survey, Bull. 621, pp. 263–4, 333; Bureau of Mines, Bull. 123, pp. 65, 265.

PERMIAN SYSTEM

DUNKARD SERIES

The Dunkard series of rocks in Ohio is confined to a narrow belt bordering the Ohio River and extending from southern Jefferson County, across Belmont, Monroe, Washington, and Athens counties, to southern Meigs County. The area is approximately 1,215 square miles and the total thickness of the strata is nearly 600 feet. The series is coal bearing in the sense that several coal beds are present. These, however, lack continuity, are thin and impoverished, or are thick, local, and shaly. In general the rocks are shales, sandstones, and limestones. The recognized coal beds are:

Green formation	Nineveh coal Hostetter coal Fish Creek coal Dunkard coal Jollytown "A" coal
Washington formation	Washington "A" coal Washington coal Little Washington coal Waynesburg "A" coal

Of these nine coals only the Waynesburg "A" and the Washington have been mined and these in a small way for local needs. The Waynesburg "A" coal is best developed along the Ohio River in southeastern Monroe and eastern Washington counties. The thickness of the bed varies from a few inches to 5 feet and the quality from moderately pure to very bony. The position of the bed is about 50 feet above the Waynesburg coal.

WASHINGTON COAL

In Ohio the Washington is by far the best defined coal bed in the Dunkard series. Its maximum development is in Belmont and southern Jefferson counties where its thickness is 3 to 15 feet. In general the entire bed is shaly but locally a part may be coal of fair quality. Its position is about 108 feet above the Waynesburg coal or 360 feet above the Pittsburgh.

Sample of Washington coal taken in 1914 by D. D. Condit from mine of S. A. Moore, one and one-half miles southwest of Alledonia, Section 33, Washington Township, Belmont County.[1]

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[1]United States Geological Survey, Bull. 621, pp. 263, 333; Bureau of Mines, Bull. 123, pp. 64, 263.

		Ft.	In.
Shale, roof.			
Coal, bony, excluded	*Washington*	2	3
Coal, bony in lower part, sampled			1
Clay, excluded			8
Coal, sampled			11
Shale, floor.			

Proximate analysis

	As received	Moisture free
Moisture	4.08	0.00
Volatile matter	33.69	35.12
Fixed carbon	41.23	42.98
Ash	21.00	21.90
	100.00	100.00

Ultimate analysis

	As received	Moisture free
Carbon	59.93	62.48
Hydrogen	4.76	4.49
Oxygen	10.36	7.01
Nitrogen	1.09	1.14
Sulphur	2.86	2.98
Ash	21.00	21.90
	100.00	100.00

Air drying loss 2.3 per cent

		As received	Moisture free
Heating value	Calories	6,012	6,268
	B. t. u.	10,822	11,282

TABLE OF ANALYSES OF OHIO COALS

SHARON OR No. 1 COAL

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Jackson	Liberty	A	13.60	31.75	50.42	4.23	0.86					6,491	11,684			Mines..	22
		B		36.75	58.35	4.90	0.99					7,513	13,523				
		A	12.77	31.51	47.94	7.78	0.97					6,259	11,266			Mines..	22
		B		36.12	54.96	8.92	1.11					7,175	12.915				
Jackson	Lick	A	10.75	35.38	48.88	4.99	0.47	67.97	5.33	19.82	1.42	6,496	11,692	2,746	2,799	Ohio...	
		B		39.64	54.77	5.59	0.53	76.16	4.64	11.49	1.59	7,278	13,100				
Jackson	Lick	A	11.58	33.03	48.74	6.65	0.47	66.25	5.27	20.06	1.30	6,337	11,407	2,939	3,007	Ohio...	
		B		37.36	55.12	7.52	0.53	74.93	4.50	11.05	1.47	7,167	12,901				
Portage	Palmyra	A	15.19	34.49	47.53	2.79	0.62	67.33	6.23	22.07	0.96	6,686	12,036	2,527	2,619	Ohio...	
		B		40.67	56.04	3.29	0.73	79.39	5.35	10.11	1.13	7,884	14,192				
Stark	Lawrence	A	6.56	40.09	49.72	3.63	0.87					7,336	13,205	2,125	2,192	Ohio...	
		B		42.90	53.21	3.89	0.93					7,850	14,130				
Stark	Tuscarawas	A	5.29	42.26	48.67	3.78	0.76	72.55	5.62	16.21	1.08	7,152	12,874	2,080	2,201	Ohio...	
		B		44.62	51.38	4.00	0.79	76.60	5.31	12.16	1.14	7,551	13,593				
	Average	A	10.82	35.50	48.84	4.84	0.58	68.53	5.61	19.54	1.19	6,680	12,023	2,483	2,564		
		B		39.72	54.84	5.44	0.65	76.77	4.95	11.20	1.13	7,488	13,479				

Average of ash for samples with complete analyses is 4 55 per cent as received and 5.10 per cent moisture free.
A refers to sample as received; B to moisture free sample.

QUAKERTOWN OR No. 2 COAL

Holmes	Monroe A	6.43	40.69	46.84	6.04	2.48					7,024	12,643	2,152	2,374	Ohio	
	B		43.48	50.06	6.46	2.65					7,506	13,511				
Jackson	Coal A	11.28	36.41	50.64	1.67	0.64	70.52	5.58	20.20	1.39	6,761	12,171	2,707	2,786	Ohio	
	B		41.04	57.08	1.88	0.72	79.49	4.88	11.46	1.57	7,621	13,719				
Jackson	Milton A	9.74	35.50	49.24	5.52	1.28	67.54	5.36	18.87	1.43	6,553	11,796	2,746	2,811	Ohio	
	B		39.33	54.55	6.12	1.42	74.83	4.74	11.31	1.58	7,260	13,069				
Jackson	Milton A	9.29	32.96	54.26	3.49	1.25				1.39	6,960	12,528			Ohio	20
	B		36.33	59.82	3.85	1.38				1.53	7,673	13,811				
Muskingum	Jackson A	9.80	35.12	49.10	5.98	1.37	68.78	5.79	16.87	1.21	6,745	12,142	2,057	2,660	Ohio	21
	B		38.94	54.43	6.63	1.52	76.25	5.21	9.05	1.34	7,478	13,460				
Vinton	Elk A	11.12	36.90	46.42	5.56	0.58	67.34	5.75	19.25	1.52	6,623	11,921	2,655	2,728	Ohio	31
	B		41.52	52.22	6.26	0.65	75.77	5.09	10.52	1.71	7,452	13,413				
Vinton	Harrison A	11.38	38.79	45.73	4.10	0.86	67.35	5.78	20.39	1.52	6,553	11,795	2,557	2,629	Ohio	31
	B		43.77	51.60	4.63	0.97	76.00	5.10	11.58	1.72	7,394	13,310				
	Average A	9.86	36.62	48.90	4.62	0.95	68.30	5.65	19.12	1.41	6,746	12,142	2,479	2,665		
	B		40.63	54.25	5.12	1.06	76.47	5.00	10.78	1.59	7,483	13,470				

Average of ash for samples with complete analyses is 4.57 per cent as received and 5.10 per cent moisture free.

BEAR RUN COAL

Scioto	Bloom A	10.44	36.20	44.84	8.52	1.03					6,352	11,434	2,635	2,713	Ohio	
	B		40.42	50.07	9.51	1.15					7,092	12,767				

MIDDLE MERCER COAL

Stark	Tuscarawas A	3.54	40.38	42.35	13.73	2.45	63.82	5.17	13.96	0.87	6,401	11,521	2,554	2,683	Ohio	
	B		41.86	43.91	14.23	2.54	66.17	4.94	11.22	0.90	6,636	11,944				

TABLE OF ANALYSES OF OHIO COALS—Continued

UPPER MERCER COAL

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Jackson	Jefferson	A	9.51	38.98	46.81	4.70	1.06					6,752	12,154	2,514	2,550	Ohio	
		B		43.07	51.74	5.19	1.17					7,462	13,431				
Lawrence	Hamilton	A	7.17	42.50	39.67	10.66	3.54					6,554	11,798	2,170	2,402	Ohio	
		B		45.78	42.74	11.48	3.81					7,060	12,709				
Scioto	Bloom	A	10.22	40.82	45.69	3.27	0.91	69.28	5.39	19.62	1.53	6,894	12,409	2,444	2,500	Ohio	
		B		45.46	50.90	3.64	1.01	77.16	4.73	11.76	1.70	7,679	13,822				
	Average	A	8.97	40.77	44.05	6.21	1.84	69.28	5.39	19.62	1.53	6,733	12,120	2,376	2,484		
		B		44.77	48.46	6.77	2.00	77.16	4.73	11.76	1.70	7,400	13,320				

BEDFORD COAL

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Coshocton	Bedford	A	1.54	46.57	35.42	16.47	3.74	64.63	4.95	8.54	1.67	6,591	11,864	2,241	2,354	Ohio	
		B		47.29	35.97	16.74	3.80	65.61	4.86	7.29	1.70	6.694	12,049				
Holmes	Prairie	A	8.02	40.97	44.93	6.08	2.53	67.58	5.00	17.40	1.41	6,837	12,306	2,116	2,374	Ohio	
		B		44.54	48.85	6.61	2.75	73.47	4.47	11.17	1.53	7,433	13,379				
Muskingum	Licking	A	5.56	39.49	44.93	10.02	2.82	67.35	5.32	13.24	1.25	6,719	12,094	2,199	2,660	Ohio	21
		B		41.81	47.58	10.61	2.99	71.31	4.98	8.79	1.32	7,115	12,806				
	Average	A	5.04	42.34	41.76	10.86	3.03	66.52	5.09	13.06	1.44	6,716	12,088	2,185	2,463		
		B		44.55	44.13	11.32	3.18	70.13	4.77	9.08	1.52	7,081	12,745				

TIONESTA OR No. 3b COAL

Muskingum	Wayne A	8.50	36.44	45.89	9.17	1.30	65.31	5.49	17.60	1.13	6,511	11,720	Not softened at 2,732°F.	Ohio	21
	B		39.83	50.15	10.02	1.42	71.38	4.97	10.98	1.23	7,116	12,809			

BROOKVILLE OR No. 4 COAL

Jackson	Jefferson A	10.64	38.26	44.43	6.67	1.17	65.67	5.94	19.02	1.53	6,477	11,659	2,739	2,780	Ohio	
	B		42.81	49.73	7.46	1.31	73.49	5.33	10.70	1.71	7,248	13,047			
Jackson	Milton A	3.63	40.05	38.36	17.96	0.95	63.86	5.36	10.66	1.21	6,407	11,533	Over 2,800	Over 2,800	Ohio
	B		41.56	39.80	18.64	0.99	66.26	5.15	7.71	1.25	6,648	11,967			
Scioto	Vernon A	9.03	37.94	44.17	8.86	3.35					6,417	11,551	2,237	2,402	Ohio
	B		41.71	48.55	9.74	3.68					7,054	12,697			
Stark	Canton A	5.18	39.90	43.62	11.30	3.62	65.29	5.21	13.39	1.19	6,593	11,867	2,544	2,668	Ohio
	B		42.09	46.01	11.90	3.82	68.88	4.90	9.24	1.26	6,953	12,515			
Vinton	Elk A	6.08	36.75	44.77	12.40	1.65	66.45	4.83	13.51	1.16	6,460	11,628	Above 2,650		Ohio	31
	B		39.13	47.67	13.20	1.76	70.75	4.42	8.64	1.23	6,878	12,381			
Vinton	Elk A	6.95	38.49	45.81	8.75	1.84	68.03	4.94	15.21	1.23	6,684	12,031	Above 2,650		Ohio	31
	B		41.36	49.24	9.40	1.98	73.11	4.48	9.71	1.32	7,183	12,930			
Vinton	Madison A	4.37	37.99	44.04	13.60	2.01	66.01	4.85	12.32	1.21	6,474	11,654	Above 2,650		Ohio	31
	B		39.73	46.05	14.22	2.10	69.03	4.56	8.82	1.27	6,771	12,187			
Wayne	Franklin A	6.81	42.64	40.54	10.01	3.28	64.53	5.55	15.87	0.76	6,548	11,787	2,300	2,399	Ohio
	B		45.76	43.50	10.74	3.52	69.24	5.14	10.55	0.81	7,027	12,649			
	Average A	6.59	39.00	43.32	11.19	2.07	65.70	5.24	14.28	1.18	6,507	11,713			
	B		41.77	46.32	11.91	2.21	70.12	4.85	9.34	1.26	6,970	12,546			

Average of ash for samples with complete analyses is 11.53 per cent as received and 12.22 per cent moisture free.

TABLE OF ANALYSES OF OHIO COALS—Continued

WINTERS COAL

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Jackson.....	Milton.....	A	9.31	36.78	47.78	6.13	2.00	67.80	5.70	17.10	1.27	6,976	12,557			Ohio...	20
		B		40.56	52.68	6.76	2.21	74.76	5.14	9.73	1.40	7,692	13,846				
Vinton.....	Elk.....	A	6.69	35.56	43.95	13.80	1.34	64.04	4.98	14.63	1.21	6,250	11,251	Above		Ohio...	31
		B		38.11	47.10	14.79	1.44	68.63	4.54	9.30	1.30	6,698	12,058	2,650			
Vinton.....	Madison.....	A	6.06	38.74	46.38	8.82	1.81	68.54	5.12	14.46	1.25	6,750	12,151	2,560	2,640	Ohio...	31
		B		41.24	49.37	9.39	1.92	72.96	4.74	9.66	1.33	7,185	12,935				
	Average.....	A	7.35	37.03	46.04	9.58	1.72	66.79	5.27	15.40	1.24	6,659	11,986				
		B		39.97	49.72	10.31	1.86	72.12	4.81	9.56	1.34	7,192	12,946				

CLARION OR No. 4a COAL

Jackson.....	Bloomfield....	A	5.31	37.33	43.82	13.54	6.08	62.05	4.98	12.12	1.23	6,394	11,509			Ohio...	9
		B		39.42	46.28	14.30	6.42	65.53	4.64	7.81	1.30	6,753	12,154				
Jackson.....	Madison.....	A	4.90	35.75	45.65	13.70	6.14	62.57	4.89	11.47	1.23	6,460	11,628			Ohio...	9
		B		37.59	48.00	14.41	6.46	65.79	4.57	7.48	1.29	6,793	12,227				
Jackson.....	Milton.....	A	5.61	38.92	47.38	8.09	3.70	67.30	5.47	14.16	1.28	6,863	12,353			Ohio...	9
		B		41.23	50.20	8.57	3.92	71.29	5.14	9.72	1.36	7,271	13,087				
Jackson.....	Milton.....	A	4.98	39.71	45.51	9.80	4.08	66.14	5.39	13.31	1.28	6,801	12,242			Ohio...	9
		B		41.79	47.90	10.31	4.29	69.61	5.09	9.35	1.35	7,157	12,883				

Jackson.....	Milton.....A	8.45	41.27	43.55	6.73	3.10					6,805	12,249			Mines..	22
	B		45.08	47.57	7.35	3.39					7,433	13,379				
	A	7.50	39.25	42.74	10.51	5.44									Mines..	22
	B		42.43	46.21	11.36	5.88										
Jackson.....	Milton.....A	5.33	41.01	45.26	8.40	3.72	66.52	5.50	14.58	1.28	6,825	12,285			Ohio...	9
	B		43.32	47.81	8.87	3.93	70.26	5.19	10.40	1.35	7,209	12,976				
Jackson.....	Milton.....A	4.71	40.51	46.17	8.61	3.73	67.51	5.44	13.45	1.26	6,911	12,440			Ohio...	9
	B		42.51	48.45	9.04	3.91	70.85	5.16	9.72	1.32	7,253	13,055				
Lawrence...	Decatur.....A	5.86	37.25	41.61	15.28	5.36	60.22	5.06	12.90	1.18	6,185	11,133			Ohio...	9
	B		39.57	44.20	16.23	5.69	63.96	4.68	8.19	1.25	6,570	11,826				
Lawrence...	Decatur.....A	6.34	35.30	40 95	17.41	5.29	57.92	4.91	13.40	1.07	5,967	10,741			Ohio...	9
	B		37.69	43.72	18.59	5.65	61.84	4.49	8.29	1.14	6,371	11,468				
Lawrence...	Decatur.....A	6.11	38.43	45.52	9.94	3.61	65.53	5.42	14.28	1.22	6,643	11,957			Ohio...	9
	B		40.93	48.48	10.59	3.85	69.79	5.05	9.42	1.30	7,075	12,735				
Lawrence...	Washington..A	6.00	39.16	42.98	11.86	5.10	63.32	5.26	13.24	1.22	6,519	11,734			Ohio...	9
	B		41.66	45.72	12.62	5.43	67.36	4.88	8.41	1.30	6,935	12,483				
Muskingum.	Hopewell.. ..A	6.89	41.49	42.92	8.70	3.02	67.28	5.57	14.24	1.19	6,706	12,071	2,057	2,107	Ohio...	21
	B		44.56	46.10	9.34	3.24	72.26	5.16	8.72	1.28	7,202	12,964				
Scioto.....	Bloom.....A	6.80	37.92	45.94	9.34	3.45	65.30	5.33	15.35	1.23	6,577	11,839			Ohio...	9
	B		40.69	49 29	10.02	3.70	70.06	4.91	9.99	1.32	7,057	12,703				
Vinton.....	Elk.....A	4.95	39.17	46.56	9.32	3.53	67.17	5.40	13.28	1.30	6,914	12,445			Ohio. .	9
	B		41.21	48.98	9.81	3.71	70.67	5.10	9.34	1.37	7,274	13,093				
Vinton.....	Madison.....A	4.80	40.56	42.21	12.43	3.51	65.56	4.96	12.33	1.21	6,567	11,821	2,550	2,610	Ohio...	31
	B		42.60	44.34	13.06	3.69	68.87	4.65	8.46	1.27	6,898	12,417				
Vinton.....	Madison.....A	5.02	39.90	46.11	8.97	3.32	67.92	5.48	12.98	1.33	6,960	12,528			Ohio...	9
	B		42.01	48.55	9.44	3.50	71.51	5.18	8.97	1.40	7,328	13,190				

TABLE OF ANALYSES OF OHIO COALS—Continued

CLARION OR No. 4a COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Vinton	Swan	A	4.90	39.16	45.79	10.15	4.25	66.26	5.40	12.71	1.23	6,845	12,321			Ohio	9
		B		41.18	48.15	10.67	4.47	69.67	5.11	8.79	1.29	7,198	12,956				
Vinton	Vinton	A	4.61	41.35	42.94	11.10	5.28	64.91	5.36	12.05	1.30	6,760	12,168			Ohio	9
		B		43.35	45.01	11.64	5.54	68.05	5.08	8.33	1.36	7,087	12,756				
Vinton	Vinton	A	5.02	40.31	46.52	8.15	2.87	68.52	5.49	13.69	1.28	6,961	12,530			Ohio	9
		B		42.44	48.98	8.58	3.02	72.14	5.19	9.72	1.35	7,329	13,192				
Vinton	Wilkesville	A	6.79	40.01	45.54	7.66	3.34					6,952	12,514			Mines	22
		B		42.92	48.86	8.22	3.58					7,458	13,424				
		A	7.38	41.60	44.86	6.16	2.77									Mines	22
		B		44.92	48.43	6.65	2.99										
Vinton	Wilkesville	A	4.72	39.88	44.19	11.21	4.16	65.04	5.36	12.95	1.28	6,744	12,139			Ohio	9
		B		41.86	46.38	11.76	4.37	68.26	5.08	9.19	1.34	7,078	12,740				
Vinton	Wilkesville	A	4.52	40.10	46.53	8.85	4.23	67.17	5.44	13.03	1.28	6,904	12,427			Ohio	9
		B		42.00	48.73	9.27	4.43	70.35	5.17	9.44	1.34	7,231	13,015				
	Average	A	5.73	39.39	44.63	10.25	4.22	65.21	5.31	13.28	1.24	6,694	12,049				
		B		41.79	47.35	10.86	4.46	68.90	4.98	8.99	1.31	7,089	12,760				

Average of ash for samples with complete analyses is 10.74 per cent as received and 11.36 per cent moisture free.

Columbiana.	Center.....A	2.53	43.66	46.24	7.57	5.02	70.64	5.38	10.26	1.13	7,372	13,270	2,482	2,590	Ohio...	28
	B		44.80	47.44	7.76	5.15	72.48	5.24	8.20	1.17	7,564	13,615				
Columbiana.	Knox.....A	4.55	42.60	45.33	7.52	4.24	68.57	5.38	13.05	1.24	7,119	12,815	2,137	2,270	Ohio...	28
	B		44.63	47.50	7.87	4.44	71.84	5.11	9.44	1.30	7,458	13,425				
Columbiana.	Liverpool....A	2.66	41.73	43.99	11.62	8.03					7,085	12,753			Mines..	193
	B		42.87	45.19	11.94	8.25					7,278	13,100				
Columbiana.	St. Clair.....A	4.03	36.69	53.03	6.25	2.61	74.65	5.46	9.39	1.64	7,496	13,493			Mines..	193
	B		38.23	55.26	6.51	2.72	77.79	5.22	6.05	1.71	7,811	14,060				
Columbiana.	St. Clair.....A	3.67	37.68	51.81	6.84	2.50	73.13	5.31	11.02	1.20	7,414	13,345	2,410	2,523	Ohio...	
	B		39.12	53.78	7.10	2.60	75.91	5.09	8.05	1.25	7,696	13,853				
Columbiana.	Yellow Creek.A	4.46	40.86	49.73	4.95	3.52					7,540	13,572			Mines .	193
	B		42.77	52.05	5.18	3.68					7,892	14,206				
Columbiana.	Yellow Creek.A	2.67	38.46	50.19	8.68	5.71					7,340	13,212			Mines..	193
	B		39.51	51.57	8.92	5.87					7,541	13,574				
Holmes.....	Killbuck.....A	7.58	40.77	43.58	8.07	3.94	65.88	5.58	15.20	1.33	6,693	12,048	2,132	2,374	Ohio...	
	B		44.11	47.16	8.73	4.26	71.28	5.13	9.16	1.44	7,242	13,036				
Holmes.....	Walnut Creek A	6.34	43.21	44.06	6.39	3.65					6,973	12,551	2,180	2,402	Ohio...	
	B		46.13	47.05	6.82	3.90					7,444	13,400				
Jackson.....	Milton.....A	9.38	36.74	46.26	7.62	4.08					6,610	11,898			USGS..	290
	B		40.54	51.05	8.41	4.50					7,294	13,129				
	A	8.95	37.82	43.89	9.34	4.41									USGS..	290
	B		41.54	48.20	10.26	4.84										
Jackson.....	Milton.....A	8.39	35.18	49.01	7.42	2.65	66.63	5.47	16.46	1.37	6,772	12,189			Ohio...	9
	B		38.40	53.50	8.10	2.89	72.73	4.96	9.82	1.50	7,392	13,306				

TABLE OF ANALYSES OF OHIO COALS—Continued

LOWER KITTANNING OR No. 5 COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Jefferson....	Knox.....	A	2.46	38.48	51.66	7.40	3.82	74.20	5.38	7.93	1.27	7,591	13,664			Ohio...	9
		B		39.45	52.96	7.59	3.92	76.07	5.24	5.88	1.30	7,782	14,008				
Jefferson....	Saline.....	A	3.44	37.17	46.71	12.68	7.30					6,907	12,433			Mines..	193
		B		38.49	48.38	13.13	7.56					7,154	12,877				
Jefferson....	Saline.....	A	2.21	39.63	47.50	10.66	4.96	71.04	5.28	6.72	1.34	7,236	13,025			Mines..	193
		B		40.53	48.57	10.90	5.07	72.65	5.14	4.87	1.37	7,400	13,320				
Lawrence...	Elizabeth.....	A	8.07	34.54	47.68	9.71	2.13	65.54	5.44	15.95	1.23	6,626	11,926			Ohio...	9
		B		37.57	51.87	10.56	2.32	71.29	4.94	9.55	1.34	7,207	12,973				
Lawrence...	Upper.....	A	7.57	38.51	45.13	8.79	3.20	66.71	5.59	14.44	1.27	6,777	12,199			Ohio...	9
		B		41.66	48.83	9.51	3.46	72.18	5.14	8.34	1.37	7,332	13,197				
Muskingum.	Newton.....	A	7.96	39.18	46.87	5.99	2.40	68.40	5.54	16.30	1.37	6,893	12,407			Ohio...	21
		B		42.57	50.92	6.51	2.61	74.31	5.06	10.02	1.49	7,489	13,480				
Muskingum.	Washington..	A	5.05	39.75	47.43	7.77	4.80	68.07	5.37	12.81	1.18	6,983	12,569			Ohio...	9
		B		41.86	49.96	8.18	5.06	71.69	5.07	8.76	1.24	7,354	13,237				
Muskingum.	Wayne.....	A	5.87	41.52	43.91	8.70	4.79	66.67	5.38	13.30	1.16	6,771	12,188	2,028	2,082	Ohio...	21
		B		44.11	46.65	9.24	5.09	70.83	5.02	8.59	1.23	7,193	12,947				
Perry.....	Pike.....	A	6.85	35.22	47.77	10.16	4.72	64.78	5.26	13.86	1.22	6,591	11,864			Ohio...	9
		B		37.81	51.28	10.91	5.07	69.54	4.83	8.34	1.31	7,075	12,735				

Perry.....	Pike.....A	6.74	37.05	49.09	7.12	2.58	68.34	5.47	15.25	1.24	6,885	12,393			Ohio...	9
	B		39.73	52.64	7.63	2.77	73.28	5.06	9.93	1.33	7,382	13,288				
Stark.....	Sandy.....A	3.81	44.34	45.80	6.05	3.44					7,268	13,083	2,264	2,349	Ohio...	
	B		46.09	47.61	6.30	3.58					7,556	13,601				
Tuscarawas.	Sandy.....A	5.61	36.25	49.42	8.72	2.89									USGS..	332
	B		38.40	52.36	9.24	3.06										
	A	4.46	39.89	47.11	8.54	3.73					7,136	12,845			USGS .	332
	B		41.75	49.31	8.94	3.90					7,469	13,444				
Tuscarawas .	Sandy.....A	5.30	38.73	48.26	7.71	3.25	69.75	5.46	12.65	1.18	7,168	12,902			Ohio...	9
	B		40.90	50.96	8.14	3.43	73.66	5.14	8.38	1.25	7,569	13,624				
	Average.....A	5.41	39.06	47.37	8.16	3.59	68.94	5.43	12.79	1.27	7,052	12,694	2,233	2,370		
	B		41.29	50.08	8.63	3.80	72.98	5.09	8.34	1.35	7,441	13,393				

Average of ash for samples with complete analyses is 7.98 per cent as received and 8.44 per cent moisture free.

MIDDLE KITTANNING OR No. 6 COAL

Athens.....	Athens.....A	6.17	36.40	49.61	7.82	0.90	69.22	5.43	15.33	1.30	6,868	12,362			Ohio...	9
	B		38.80	52.87	8.33	0.96	73.77	5.05	10.50	1.39	7,319	13,174				
Athens.....	Canaan.....A	6.36	34.19	50.96	8.49	0.51	69.25	5.40	14.92	1.43	6,919	12,454			Ohio...	9
	B		36.51	54.42	9.07	0.54	73.95	5.01	9.90	1.53	7,389	13,300				
Athens.....	Dover.....A	7.14	34.22	51.92	6.72	1.65	69.32	5.56	15.45	1.30	6,863	12,353			Ohio...	9
	B		36.85	55.91	7.24	1.78	74.65	5.14	9.80	1.39	7,390	13,302				
Athens.....	Trimble .....A	7.28	32.38	53.61	6.73	0.86	69.46	5.45	16.16	1.34	6,894	12,409			Ohio...	9
	B		34.92	57.82	7.26	0.93	74.91	5.00	10.45	1.45	7,435	13,383				
Athens.....	Waterloo.....A	6.80	36.90	48.25	8.05	2.14	67.40	5.49	15.55	1.37	6,794	12,229			Ohio...	9
	B		39.59	51.77	8.64	2.30	72.32	5.07	10.20	1.47	7,290	13,122				

TABLE OF ANALYSES OF OHIO COALS—Continued

MIDDLE KITTANNING OR No. 6 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Athens	Waterloo	A	6.70	35.36	51.19	6.75	2.28	69.21	5.49	15.09	1.18	6,921	12,458			Ohio	9
		B		37.90	54.87	7.23	2.44	74.18	5.09	9.80	1.26	7,418	13,352				
Carroll	Orange	A	3.76	39.11	50.34	6.79	3.06	71.99	5.36	11.40	1.40	7,238	13,028			Ohio	9
		B		40.64	52.31	7.05	3.18	74.80	5.13	8.38	1.46	7,521	13,537				
Columbiana	Liverpool	A	4.79	34.83	52.95	7.43	1.79	73.99	5.39	10.02	1.38	7,329	13,192			Mines	193
		B		36.58	55.62	7.80	1.88	77.71	5.10	6.06	1.45	7,698	13,856				
Columbiana	Liverpool	A	4.33	36.75	54.31	4.61	1.46					7,589	13,660			Mines	193
		B		38.41	56.77	4.82	1.53					7,933	14,279				
Columbiana	Liverpool	A	5.08	35.78	53.15	5.99	2.07					7,412	13,342			Mines	193
		B		37.69	56.00	6.31	2.18					7,809	14,056				
Columbiana	Liverpool	A	3.60	36.16	55.64	4.60	1.76	77.06	5.46	9.74	1.38	7,789	14,020			Ohio	9
		B		37.51	57.72	4.77	1.83	79.94	5.25	6.78	1.43	8,080	14,544				
Columbiana	Yellow Creek	A	3.41	34.66	51.18	10.75	0.70	71.62	5.22	10.26	1.45	7,128	12,830			Mines	193
		B		35.88	52.99	11.13	0.72	74.15	5.01	7.49	1.50	7,380	13,284				
Coshocton	Adams	A	4.58	39.18	47.49	8.75	5.36	67.51	5.40	11.74	1.24	6,878	12,380			Ohio	9
		B		41.06	49.77	9.17	5.62	70.75	5.12	8.04	1.30	7,208	12,974				
Coshocton	Clark	A	5.30	39.08	49.47	6.15	3.72	69.59	5.50	13.92	1.12	7,084	12,751			Ohio	9
		B		41.27	52.24	6.49	3.93	73.48	5.18	9.74	1.18	7,480	13,464				

Coshocton...	Crawford.....A	4.70	39.20	44.81	11.29	5.60	64.78	5.23	11.98	1.12	6,594	11,869	Ohio...	9
	B		41.13	47.02	11.85	5.88	67.97	4.94	8.18	1.18	6,919	12,454		
Coshocton..	Franklin.....A	4.33	41.11	48.97	5.59	4.00	71.42	5.41	12.36	1.22	7,269	13,084	Ohio...	9
	B		42.97	51.19	5.84	4.18	74.65	5.15	8.90	1.28	7,598	13,676		
Coshocton...	Jackson.....A	5.32	40.93	47.45	6.30	4.22	69.29	5.50	13.45	1.24	7,086	12,755	Ohio...	9
	B		43.23	50.12	6.65	4.46	73.18	5.19	9.21	1.31	7,484	13,471		
Coshocton...	Keene.....A	5.40	39.92	49.60	5.08	3.18	70.90	5.58	14.02	1.24	7,194	12,949	Ohio...	9
	B		42.20	52.43	5.37	3.36	74.95	5.26	9.75	1.31	7,605	13,689		
Coshocton...	Lafayette....A	5.60	34.69	46.43	13.28	4.87	61.59	4.95	14.23	1.08	6,222	11,200	Ohio...	9
	B		36.75	49.18	14.07	5.16	65.24	4.59	9.80	1.14	6,591	11,864		
Coshocton...	Linton.....A	10.93	34.00	48.43	6.64	2.03	63.08	5.37	21.73	1.15	6,133	11,039	Ohio...	9
	B		38.17	54.37	7.46	2.28	70.81	4.67	13.49	1.29	6,885	12,393		
Coshocton...	Linton.....A	4.37	40.97	49.30	5.36	3.61	71.34	5.56	12.85	1.28	7,247	13,045	Ohio...	9
	B		42.84	51.55	5.61	3.77	74.60	5.30	9.38	1.34	7,578	13,640		
Coshocton...	Oxford.....A	4.44	40.71	50.40	4.45	3.54	72.65	5.53	12.48	1.35	7,351	13,231	Ohio...	9
	B		42.60	52.74	4.66	3.70	76.03	5.27	8.93	1.41	7,693	13,847		
Coshocton...	Virginia.....A	5.12	38.99	48.87	7.02	3.87	69.49	5.45	12.97	1.20	7,066	12,719	Ohio...	9
	B		41.09	51.51	7.40	4.08	73.24	5.14	8.87	1.27	7,447	13,405		
Coshocton...	White Eyes...A	5.32	37.39	48.69	8.60	4.36	67.41	5.32	13.13	1.18	6,828	12,290	Ohio...	9
	B		39.49	51.43	9.08	4.60	71.20	5.00	8.87	1.25	7,212	12,982		
Coshocton..	White Eyes ..A	4.50	38.73	50.80	5.97	3.63	70.94	5.53	12.63	1.30	7,173	12,911	Ohio...	9
	B		40.55	53.20	6.25	3.80	74.28	5.27	9.04	1.36	7,511	13,519		
Gallia.....	Greenfield....A	8.08	37.53	45.87	8.52	3.64	65.71	5.48	15.47	1.18	6,717	12,091	Ohio...	9
	B		40.83	49.90	9.27	3.96	71.49	4.98	9.02	1.28	7,307	13,153		
Hocking....	Green.....A	6.55	37.30	49.18	6.97	2.57	68.40	5.45	15.43	1.18	6,901	12,422	Ohio...	9
	B		39.91	52.63	7.46	2.75	73.19	5.05	10.29	1.26	7,385	13,293		

TABLE OF ANALYSES OF OHIO COALS—Continued

MIDDLE KITTANNING OR No. 6 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Hocking	Starr	A	6.52	38.30	47.15	8.03	3.52	67.33	5.49	14.43	1.20	6,850	12,330			Ohio	9
		B		40.97	50.44	8.59	3.77	72.03	5.10	9.23	1.28	7,328	13,190				
Hocking	Ward	A	7.55	34.03	52.57	5.85	0.77	70.05	5.52	16.39	1.42	6,950	12,510			Ohio	9
		B		36.81	56.86	6.33	0.83	75.77	5.06	10.47	1.54	7,518	13,532				
Hocking	Ward	A	7.45	35.01	52.73	4.81	0.66	71.04	5.53	16.53	1.43	7,057	12,703			Ohio	9
		B		37.83	56.97	5.20	0.71	76.76	5.08	10.71	1.54	7,625	13,725				
Hocking	Ward	A	7.40	34.17	53.43	5.00	1.06	70.58	5.55	16.49	1.32	7,027	12,649			Ohio	9
		B		36.90	57.70	5.40	1.14	76.22	5.11	10.70	1.43	7,589	13,660				
Hocking	Ward	A	9.72	32.44	53.41	4.43	0.54	69.50	5.70	18.58	1.25	6,804	12,247			Mines	22
		B		35.93	59.16	4.91	0.60	76.99	5.12	11.00	1.38	7,537	13,567				
Holmes	Clark (German)	A	5.84	40.29	48.60	5.27	2.65					7,093	12,767	2,152	2,402	Ohio	
		B		42.79	51.61	5.60	2.82					7,533	13,559				
Holmes	Walnut Creek	A	7.31	34.92	53.56	4.21	1.00	70.62	5.42	17.31	1.44	6,952	12,514			Ohio	9
		B		37.68	57.78	4.54	1.08	76.19	4.97	11.66	1.56	7,500	13,500				
Jefferson	Saline	A	2.64	36.75	49.46	11.15	2.07	71.04	5.26	8.99	1.49	7,158	12,884			Mines	193
		B		37.75	50.80	11.45	2.13	72.97	5.10	6.82	1.53	7,352	13,234				
Lawrence	Perry	A	6.64	34.28	48.16	10.92	3.32	64.95	5.16	14.42	1.23	6,626	11,927			Ohio	9
		B		36.72	51.58	11.70	3.55	69.57	4.73	9.13	1.32	7,097	12,775				

Mahoning...	Green.....A	5.23	36.86	53.19	4.72	2.17	73.84	5.50	12.36	1.41	7,502	13,504			Ohio...	9
	B		38.89	56.13	4.98	2.29	77.91	5.19	8.14	1.49	7,916	14,249				
Mahoning...	Green.....A	5.04	40.14	51.31	3.51	1.06	74.14	5.42	14.46	1.41	7,426	13,366	2,478	2,580	Ohio...	28
	B		42.27	54.03	3.70	1.12	78.07	5.13	10.49	1.49	7,819	14,075				
Muskingum.	Adams.....A	5.63	44.70	44.84	4.83	3.32	71.41	5.69	13.50	1.25	7,206	12,971	2,014	2,107	Ohio...	21
	B		47.37	47.51	5.12	3.51	75.67	5.37	9.00	1.33	7,635	13,743				
Muskingum.	Brush Creek..A	5.08	39.75	45.40	9.77	5.54	65.74	5.32	12.49	1.14	6,802	12,244			Ohio...	9
	B		41.88	47.83	10.29	5.84	69.25	5.01	8.41	1.20	7,166	12,899				
Muskingum.	Brush Creek..A	5.65	44.36	42.85	7.14	4.43	68.35	5.64	13.42	1.02	6,960	12,528	2,028	2,120	Ohio...	21
	B		47.01	45.42	7.57	4.70	72.44	5.31	8.90	1.08	7,377	13,278				
Muskingum.	Harrison.....A	4.67	40.32	45.18	9.83	4.10	67.71	5.38	11.82	1.16	6,873	12,371			Ohio...	9
	B		42.30	47.39	10.31	4.30	71.03	5.10	8.05	1.21	7,210	12,978				
Muskingum.	Madison.....A	4.75	39.88	46.09	9.28	5.35	66.69	5.35	12.05	1.28	6,854	12,337			Ohio...	9
	B		41.87	48.39	9.74	5.62	70.02	5.06	8.22	1.34	7,196	12,952				
Muskingum.	Madison.....A	4.62	40.95	47.85	6.58	4.49	69.58	5.47	12.58	1.30	7,126	12,827			Ohio...	9
	B		42.93	50.17	6.90	4.71	72.95	5.20	8.88	1.36	7,471	13,448				
Muskingum.	Madison.....A	6.13	44.25	44.42	5.20	3.64	70.02	5.76	14.16	1.22	7,108	12,794			Ohio...	21
	B		47.14	47.32	5.54	3.88	74.59	5.41	9.28	1.30	7,572	13,629				
Muskingum.	Monroe.....A	5.52	44.73	45.12	4.63	3.50	70.90	5.66	14.20	1.11	7,241	13,034			Ohio...	21
	B		47.34	47.76	4.90	3.70	75.04	5.35	9.83	1.18	7,664	13,795				
Muskingum.	Monroe.....A	5.88	43.81	46.51	3.80	2.98	72.18	5.74	14.03	1.27	7,308	13,154			Ohio...	21
	B		46.55	49.41	4.04	3.17	76.68	5.41	9.35	1.35	7,764	13,975				
Muskingum.	Muskingum..A	5.55	40.27	48.95	5.23	3.63	70.54	5.57	13.77	1.26	7,191	12,944			Ohio...	9
	B		42.63	51.83	5.54	3.84	74.69	5.24	9.36	1.33	7,614	13,705				
Muskingum.	Newton.....A	5.02	38.16	47.26	9.56	5.97	65.88	5.29	12.18	1.12	6,758	12,164			Ohio...	9
	B		40.18	49.76	10.06	6.29	69.36	4.98	8.13	1.18	7,115	12,807				

TABLE OF ANALYSES OF OHIO COALS—Continued

MIDDLE KITTANNING OR No. 6 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Muskingum.	Washington..	A	5.44	39.15	46.13	9.28	3.77	67.16	5.34	13.27	1.18	6,822	12,280			Ohio...	9
		B		41.40	48.79	9.81	3.99	71.02	5.01	8.92	1.25	7,214	12,985				
Muskingum.	Wayne.....	A	5.93	45.69	42.54	5.84	3.71	67.21	5.67	16.33	1.24	7,067	12,721			Ohio...	21
		B		48.56	45.23	6.21	3.94	71.45	5.32	11.76	1.32	7,512	13,522				
Perry.....	Bearfield.....	A	5.90	36.58	47.42	10.10	4.96	65.43	5.26	13.03	1.22	6,686	12,035			Ohio...	9
		B		38.87	50.40	10.73	5.27	69.53	4.90	8.28	1.29	7,105	12,789				
Perry.....	Clayton	A	6.72	38.30	48.34	6.64	2.43	68.45	5.61	15.58	1.29	6,903	12,425			Ohio...	9
		B		41.07	51.82	7.11	2.60	73.38	5.22	10.30	1.39	7,400	13,320				
Perry.....	Harrison.....	A	7.21	37.60	49.93	5.26	2.34	69.77	5.60	15.77	1.26	7,008	12,614			Ohio...	9
		B		40.52	53.81	5.67	2.52	75.19	5.17	10.09	1.36	7,553	13,595				
Perry.....	Harrison.....	A	5.70	38.83	47.02	8.45	3.38	67.77	5.37	13.85	1.18	6,851	12,332			Ohio...	9
		B		41.18	49.86	8.96	3.58	71.87	5.03	9.31	1.25	7,265	13,077				
Perry.....	Harrison.....	A	6.40	38.00	48.02	7.58	2.72	68.06	5.49	14.89	1.26	6,867	12,361			Ohio...	9
		B		40.60	51.30	8.10	2.90	72.71	5.11	9.83	1.35	7,337	13,206				
Perry.....	Monroe.....	A	6.79	35.45	51.85	5.91	1.00	70.30	5.49	16.00	1.30	6,983	12,569			Ohio...	9
		B		38.04	55.62	6.34	1.07	75.42	5.08	10.70	1.39	7,492	13,485				
Perry.....	Pike.....	A	7.00	37.12	48.93	6.95	2.33	68.29	5.58	15.59	1.26	6,880	12,384			Ohio...	9
		B		39.91	52.62	7.47	2.51	73.43	5.16	10.08	1.35	7,398	13,316				

Perry	Pike	A	5.25	38.85	46.04	9.86	3.43	66.05	5.38	14.10	1.18	6,773	12,191			Ohio...	9
		B		41.00	48.59	10.41	3.62	69.71	5.07	9.95	1.24	7,148	12,866				
Perry	Pike	A	8.87	39.32	47.81	4.00	1.74									USGS..	290
		B		43.15	52.46	4.39	1.92										
		A	8.92	38.58	46.65	5.85	3.00					6,849	12,328			USGS .	290 P
		B		42.36	51.22	6.42	3.29					7,520	13,536				
Perry	Salt Lick	A	7.76	33.50	51.27	7.47	1.45	68.30	5.46	16.14	1.18	6,772	12,190			Ohio...	9
		B		36.32	55.58	8.10	1.57	74.04	4.99	10.02	1.28	7,342	13,216				
Perry	Salt Lick	A	10.78	34.86	48.23	6.13	1.11					6,663	11,993			USGS..	290
		B		39.07	54.06	6.87	1.24					7,468	13,442				
		A	9.79	35.74	48.46	6.01	1.43									USGS..	290
		B		39.62	53.72	6.66	1.59										
Stark	Lexington	A	5.99	39.05	50.14	4.82	3.61	71.82	5.56	12.86	1.33	7,314	13,165			Ohio...	9
		B		41.54	53.33	5.13	3.84	76.39	5.21	8.02	1.41	7,780	14,004				
Stark	Nimishillen	A	5.65	38.51	45.76	10.08	4.13	66.92	5.29	12.39	1.19	6,868	12,362			Ohio...	9
		B		40.82	48.50	10.68	4.38	70.93	4.94	7.81	1.26	7,279	13,102				
Stark	Sandy	A	6.49	40.26	46.64	6.61	1.93					6,942	12,495	2,192	2,282	Ohio...	
		B		43.05	49.88	7.07	2.07					7,423	13,362				
Stark	Sandy	A	6.66	36.24	48.88	8.22	2.66	68.94	5.37	13.61	1.20	6,977	12,559			Ohio...	9
		B		38.82	52.37	8.81	2.85	73.86	4.96	8.24	1.28	7,475	13,455				
Tuscarawas	Auburn	A	4.30	40.07	48.00	7.63	3.97	69.39	5.41	12.32	1.28	7,001	12,602			Ohio...	9
		B		41.87	50.16	7.97	4.15	72.51	5.15	8.88	1.34	7,316	13,169				
Tuscarawas	Bucks	A	5.19	40.79	48.15	5.87	3.55	70.12	5.59	13.51	1.36	7,122	12,820			Ohio...	9
		B		43.02	50.79	6.19	3.74	73.95	5.29	9.40	1.43	7,512	13,522				
Tuscarawas	Clay	A	3.41	39.73	47.48	9.38	4.88	68.77	5.23	10.44	1.30	6,971	12,548			Ohio...	9
		B		41.14	49.15	9.71	5.05	71.20	5.02	7.67	1.35	7,217	12,991				

TABLE OF ANALYSES OF OHIO COALS—Continued

MIDDLE KITTANNING OR No 6 COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Tuscarawas	Dover	A	3.52	40.25	50.22	6.01	3.17	72.13	5.41	12.00	1.28	7,297	13,135			Ohio	9
		B		41.72	52.05	6.23	3.29	74.76	5.20	9.19	1.33	7,563	13,613				
Tuscarawas	Dover	A	4.94	36.20	49.36	9.50	4.19	67.54	5.14	12.33	1.30	6,856	12,341			Ohio	9
		B		38.08	51.93	9.99	4.41	71.07	4.83	8.33	1.37	7,214	12,985				
Tuscarawas	Fairfield	A	4.66	39.25	49.87	6.22	3.28	70.80	5.48	12.94	1.28	7,097	12,775			Ohio	9
		B		41.17	52.31	6.52	3.44	74.26	5.21	9.23	1.34	7,444	13,399				
Tuscarawas	Fairfield	A	7.15	38.34	49.95	4.56	2.62	71.29	5.64	14.66	1.23	7,194	12,949			Ohio	9
		B		41.29	53.80	4.91	2.82	76.78	5.22	8.95	1.32	7,748	13,946				
Tuscarawas	Goshen	A	3.51	41.60	47.20	7.69	4.56	70.26	5.45	10.82	1.22	7,153	12,875			Ohio	9
		B		43.11	48.92	7.97	4.73	72.82	5.24	7.98	1.26	7,413	13,343				
Tuscarawas	Jefferson	A	4.72	40.30	49.51	5.47	4.05	71.08	5.53	12.55	1.32	7,199	12,958			Ohio	9
		B		42.30	51.96	5.74	4.25	74.60	5.26	8.77	1.38	7,555	13,599				
Tuscarawas	Lawrence	A	4.69	39.57	46.68	9.06	4.70	67.59	5.30	12.11	1.24	6,881	12,386			Ohio	9
		B		41.53	48.97	9.50	4.94	70.92	5.01	8.33	1.30	7,220	12,996				
Tuscarawas	Mill	A	3.78	38.27	49.53	8.42	3.83	70.31	5.26	10.96	1.22	7,101	12,782			Ohio	9
		B		39.77	51.48	8.75	3.98	73.07	5.03	7.90	1.27	7,380	13,284				
Tuscarawas	Salem	A	3.45	40.02	48.86	7.67	5.22	70.02	5.30	10.53	1.26	7,135	12,843			Ohio	9
		B		41.45	50.61	7.94	5.41	72.52	5.09	7.74	1.30	7,390	13,302				

Tuscarawas.	Sandy.....A	4.92	38.13	49.91	7.04	2.91	70.45	5.40	12.92	1.28	7,082	12,748			Ohio...	9
	B		40.10	52.50	7.40	3.06	74.10	5.11	8.99	1.34	7,448	13,406				
Tuscarawas.	Union.....A	3.81	38.71	51.47	6.01	3.24	72.30	5.41	11.68	1.36	7.306	13,151			Ohio...	9
	B		40.24	53.51	6.25	3.36	75.16	5.19	8.63	1.41	7,595	13,671				
Tuscarawas.	Warwick.....A	4.10	41.64	49.05	5.21	3.25	72.45	5.57	12.10	1.42	7,331	13,196			Ohio...	9
	B		43.42	51.15	5.43	3.38	75.55	5.34	8.82	1.48	7,644	13,759				
Tuscarawas.	York.....A	3.18	43.56	46.33	6.93	4.12	71.13	5.50	11.04	1.28	7,305	13,149			Ohio...	9
	B		44.99	47.85	7.16	4.25	73.46	5.32	8.49	1.32	7,545	13,581				
Vinton.....	Brown.....A	8.32	39.46	43.52	8.70	3.38	65.42	5.53	15.59	1.38	6,502	11,704	2,406	2,509	Ohio...	31
	B		43.04	47.47	9.49	3.69	71.36	5.03	8.93	1.50	7,092	12,766				
Vinton.....	Brown.....A	9.89	38.14	43.58	8.39	3.25	64.56	5.59	16.74	1.47	6,387	11,496	2,406	2,478	Ohio...	31
	B		42.32	48.36	9.32	3.61	71.65	4.98	8.81	1.63	7,088	12,758				
Vinton.....	Brown.....A	7.83	41.71	44.73	5.73	2.66	68.68	5.74	15.66	1.53	6,779	12,202	2,388	2,478	Ohio...	31
	B		45.25	48.53	6.22	2.89	74.51	5.28	9.44	1.66	7,355	13,239				
Vinton.....	Brown.....A	8.58	40.53	40.36	10.53	4.07	62.97	5.55	15.55	1.33	6,322	11,379	2,406	2,509	Ohio...	31
	B		44.33	44.15	11.52	4.45	68.88	5.03	8.67	1.45	6,915	12,447				
	Average.....A	5.88	38.44	48.64	7.04	3.17	69.21	5.46	13.70	1.27	6,995	12,591	2,274	2,385		
	B		40.83	51.69	7.48	3.36	73.40	5.11	9.16	1.35	7,425	13,365				

Average of ash for samples with complete analyses is 7.19 per cent as received and 7.62 per cent moisture free.

LOWER FREEPORT OR No. 6a COAL

Columbiana.	St. Clair.....A	3.58	38.47	47.48	10.47	4.49	70.04	5.39	8.05	1.56	7,138	12,848			Mines..	193
	B		39.90	49.24	10.86	4.66	72.64	5.18	5.04	1.62	7,403	13,325				
Columbiana.	Yellow Creek.A	5.94	32.73	49.81	11.52	1.49	68.30	5.28	12.06	1.35	6,726	12,107			Mines..	193
	B		34.80	52.95	12.25	1.58	72.62	4.91	7.20	1.44	7,151	12,872				
Jefferson....	Island Creek.A	0.00	40.89	48.41	10.70	3.47					7,184	12,931	2,372	2,480	Ohio	
	B		40.89	48.41	10.70	3.47					7,184	12,931				

TABLE OF ANALYSES OF OHIO COALS—Continued

LOWER FREEPORT OR No. 6a COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Jefferson....	Island Creek..	A	3.10	38.06	48.91	9.93	3.60	70.53	5.14	9.70	1.10	7,222	12,999	2,390	2,480	Ohio ..	
		B		39.28	50.47	10.25	3.71	72.79	4.96	7.15	1.14	7,453	13,415				
Jefferson....	Saline.....	A	4.26	35.55	48.10	12.09	2.36					6,941	12,494			Mines..	193
		B		37.13	50.24	12.63	2.46					7,250	13,050				
Jefferson....	Springfield...	A	3.40	38.01	52.37	6.22	2.20					7,518	13,532			Mines..	85
		B		39.35	54.21	6.44	2.28					7,783	14,009				
		A	3.50	37.93	50.63	7.94	3.14					7,364	13,255			Mines..	85
		B		39.31	52.46	8.23	3.25					7,631	13,736				
		A	3.59	37.03	50.64	8.74	3.70	71.30	5.19	9.68	1.39	7,224	13,003			Mines..	85
		B		38.41	52.52	9.07	3.84	73.95	4.97	6.73	1.44	7,493	13,487				
Jefferson....	Springfield...	A	3.83	41.00	47.68	7.49	2.86	71.76	5.50	11.22	1.17	7,269	13,084	2,358	2,415	Ohio ..	
		B		42.64	49.57	7.79	2.98	74.62	5.28	8.11	1.22	7,558	13,604				
Jefferson....	Springfield...	A	3.36	37.56	52.06	7.02	2.40									Mines..	85
		B		38.87	53.87	7.26	2.48										
		A	3.66	37.43	51.23	7.68	3.07					7,342	13,216			Mines..	85
		B		38.85	53.18	7.97	3.19					7,621	13,718				
		A	3.52	38.31	50.78	7.39	2.99					7,363	13,253			Mines..	85
		B		39.71	52.63	7.66	3.10					7,632	13,738				

		A	3.27	38.87	50.37	7.49	3.23					7,359	13,246			Mines..	85
		B		40.18	52.08	7.74	3.34					7,608	13,694				
Jefferson....	Springfield...	A	3.58	37.58	49.17	9.67	3.08					7,156	12,881			Mines..	85
		B		38.97	51.00	10.03	3.19					7,421	13,358				
		A	3.47	38.61	49.66	8.26	2.40					7,346	13,223			Mines..	85
		B		40.00	51.44	8.56	2.49					7,610	13,698				
		A	4.04	38.61	48.93	8.42	2.95					7,234	13,021			Mines..	85
		B		40.24	50.99	8.77	3.07					7,539	13,570				
Jefferson....	Steubenville..	A	0.00	40.91	53.66	5.43	1.58	76.95	5.17	9.47	1.40	7,633	13,740	2,480	2,566	Ohio...	
		B		40.91	53.66	5.43	1.58	76.95	5.17	9.47	1.40	7,633	13,740				
Jefferson....	Steubenville..	A	3.82	35.90	53.43	6.85	1.90	74.20	5.24	10.36	1.45	7,418	13,352			Mines..	85
		B		37.33	55.55	7.12	1.98	77.15	5.01	7.23	1.51	7,712	13,882				
		A	3.80	35.39	53.39	7.42	1.91					7,344	13,219			Mines..	85
		B		36.79	55.50	7.71	1.99					7,634	13,741				
Muskingum.	Madison.....	A	5.35	44.46	43.33	6.86	2.09	70.03	5.85	13.77	1.40	7,099	12,778	2,107	2,174	Ohio...	21
		B		46.97	45.78	7.25	2.20	73.99	5.56	9.53	1.47	7,500	13,500				
	Average.....	A	3.45	38.17	50.00	8.38	2.71	71.64	5.35	10.54	1.35	7,258	13,062	2,341	2,423		
		B		39.52	51.79	8.69	2.82	74.34	5.13	7.56	1.40	7,517	13,530				

Average of ash for samples with complete analyses is 8.41 per cent as received and 8.75 per cent moisture free.

UPPER FREEPORT OR No. 7 COAL

Columbiana.	Madison.....	A	3.37	37.89	51.68	7.06	2.92					7,471	13,448			Mines..	193
		B		39.21	53.48	7.31	3.02					7,731	13,916				
		A	3.77	38.32	49.93	7.98	3.65					7,398	13,316			Mines..	193
		B		39.82	51.89	8.29	3.79					7,688	13,838				
		A	3.60	37.80	51.22	7.38	3.21	73.68	5.35	8.53	1.85	7,439	13,390			Mines..	193
		B		39.21	53.13	7.66	3.33	76.43	5.13	5.53	1.92	7,716	13,889				

TABLE OF ANALYSES OF OHIO COALS—Continued

UPPER FREEPORT OR No. 7 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Columbiana.	Madison....	A	2.45	36.97	49.95	10.63	3.80	69.39	5.07	9.90	1.21	7,152	12,874	2,312	2,482	Ohio...	28
		B		37.89	51.22	10.89	3.89	71.12	4.92	7.94	1.24	7,331	13,196				
Columbiana.	Middleton....	A	3.17	36.96	54.27	5.60	2.04	75.63	5.35	10.05	1.33	7,674	13,813	2,315	2,408	Ohio...	28
		B		38.17	56.04	5.79	2.11	78.11	5.16	7.46	1.37	7,926	14,266				
Columbiana.	St. Clair.....	A	4.27	36.43	47.66	11.64	3.04					6,977	12,559			Mines..	193
		B		38.05	49.79	12.16	3.18					7,288	13,118				
Columbiana.	St. Clair.....	A	5.27	36.28	49.51	8.94	4.01					7,118	12,812			Mines..	193
		B		38.30	52.26	9.44	4.23					7,514	13,525				
Columbiana.	Washington..	A	3.42	38.66	49.18	8.74	3.61	70.45	5.17	10.71	1.32	7,721	12,998	2,454	2,552	Ohio...	28
		B		40.03	50.92	9.05	3.73	72.94	4.96	7.96	1.36	7,477	13,459				
Columbiana.	West.....	A	7.18	34.96	48.91	8.95	2.52	66.72	5.15	15.41	1.25	6,705	12,069	2,187	2,305	Ohio...	28
		B		37.66	52.69	9.65	2.72	71.88	4.69	9.72	1.34	7,224	13,003				
Columbiana.	Yellow Creek.	A	5.13	38.01	48.58	8.28	3.78					7,200	12,960			Mines..	193
		B		40.07	51.20	8.73	3.98					7,590	13,662				
Columbiana.	Yellow Creek.	A	3.43	37.81	51.28	7.48	2.86	74.31	5.53	8.34	1.48	7,425	13,365			Mines..	193
		B		39.15	53.10	7.75	2.96	76.95	5.33	5.48	1.53	7,689	13,840				
Columbiana.	Yellow Creek.	A	3.46	36.74	48.87	10.93	4.28	69.89	5.24	8.28	1.38	7,073	12,731			Mines..	193
		B		38.06	50.62	11.32	4.43	72.39	5.03	5.40	1.43	7,326	13,187				

Coshocton...	Clark.....	A	6.40	37.92	52.49	3.19	2.01	72.72	5.67	15.16	1.25	7,325	13,185			Ohio...	9
		B		40.51	56.08	3.41	2.15	77.69	5.30	10.12	1.33	7,826	14,086				
Gallia.....	Walnut.....	A	7.62	32.85	47.14	12.39	1.81	63.48	5.19	15.85	1.28	6,371	11,468			Ohio...	9
		B		35.56	51.03	13.41	1.96	68.71	4.70	9.83	1.39	6,896	12,413				
Guernsey...	Center.....	A	6.47	35.90	51.85	5.78	1.13	72.59	5.41	13.68	1.41	7,076	12,736	2,541	2,606	Ohio...	
		B		38.38	55.44	6.18	1.21	77.61	5.01	8.48	1.51	7,565	13,617				
Guernsey...	Center.....	A	5.80	36.89	50.73	6.58	2.62									USGS..	290
		B		39.16	53.85	6.99	2.78										
		A	6.28	35.81	50.61	7.30	3.55					7,056	12,701			USGS..	290
		B		38.21	54.00	7.79	3.79					7,529	13,552				
Guernsey...	Richland.....	A	4.98	36.42	51.36	7.24	1.38	71.99	5.27	12.69	1.43	7,094	12,769	2,298	2,406	Ohio...	
		B		38.33	54.05	7.62	1.45	75.76	4.97	8.70	1.50	7,466	13,438				
Guernsey...	Richland.....	A	5.37	35.80	50.78	8.05	1.64					7,102	12,784			USGS..	621
		B		37.83	53.66	8.51	1.73					7,505	13,509				
		A	6.38	33.67	52.14	7.81	2.16					7,015	12,627			USGS..	621
		B		35.96	55.70	8.34	2.31					7,493	13,487				
		A	6.00	34.22	51.95	7.83	1.98	71.38	5.38	12.11	1.32	7,067	12,721			USGS..	621
		B		36.40	55.27	8.33	2.11	75.93	5.01	7.22	1.40	7,518	13,532				
Guernsey...	Richland.....	A	6.09	35.22	51.76	6.93	1.62					7,077	12,739			USGS..	621
		B		37.50	55.12	7.38	1.72					7,536	13,565				
		A	5.95	35.73	50.37	7.95	2.15					7,034	12,661			USGS..	621
		B		37.99	53.56	8.45	2.28					7,479	13,462				
		A	6.07	35.04	51.56	7.33	1.95	71.24	5.37	12.72	1.39	7,062	12,712			USGS..	621
		B		37.30	54.90	7.80	2.08	75.84	5.00	7.80	1.48	7,518	13,532				
Guernsey...	Valley.....	A	5.32	36.86	51.45	6.37	1.39	72.36	5.32	13.15	1.41	7,133	12,840	2,590	2,663	Ohio...	
		B		38.93	54.34	6.73	1.47	76.43	5.00	8.88	1.49	7,534	13,561				

TABLE OF ANALYSES OF OHIO COALS—Continued

UPPER FREEPORT OR No. 7 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Guernsey...	Valley.....	A	5.07	38.65	48.31	7.97	2.84	70.32	5.20	12.09	1.58	6,976	12,556	2,406	2,494	Ohio...	
		B		40.71	50.89	8.40	2.99	74.08	4.89	7.97	1.67	7,348	13,226				
Guernsey...	Valley.....	A	5.78	36.45	51.38	6.39	1.77	72.19	5.31	13.04	1.30	7,106	12,790	2,494	2,566	Ohio...	
		B		38.69	54.53	6.78	1.88	76.62	4.96	8.38	1.38	7,542	13,575				
Guernsey...	Valley.....	A	6.88	34.07	53.30	5.75	0.84					7,104	12,787			USGS..	621
		B		36.58	57.24	6.18	0.90					7,628	13,732				
		A	6.25	36.16	52.29	5.30	0.88					7,224	13,003			USGS..	621
		B		38.57	55.78	5.65	0.94					7,705	13,869				
		A	6.49	35.41	52.57	5.53	0.88	73.41	5.49	13.32	1.37	7,189	12,940			USGS..	621
		B		37.87	56.22	5.91	0.94	78.50	5.10	8.08	1.47	7,688	13,838				
Harrison....	Freeport.....	A	6.17	38.18	47.72	7.93	3.62	69.51	5.28	12.25	1.41	7,002	12,604	2,316	2,460	Ohio...	
		B		40.69	50.86	8.45	3.86	74.08	4.89	7.22	1.50	7,462	13,432				
Harrison....	Monroe.....	A	6.84	36.01	46.88	10.27	2.63	67.22	5.16	13.30	1.42	6,650	11,970	2,316	2,460	Ohio...	
		B		38.65	50.32	11.03	2.82	72.16	4.72	7.75	1.52	7,138	12,848				
Jefferson...	Saline.....	A	4.75	38.28	51.91	5.06	1.76					7,480	13,464			Mines..	193
		B		40.19	54.50	5.31	1.85					7,853	14,135				
		A	3.43	36.26	49.57	10.74	5.05	69.66	5.15	8.03	1.37	7,068	12,722			Mines..	193
		B		37.55	51.33	11.12	5.23	72.13	4.94	5.16	1.42	7,319	13,174				

Jefferson....	Saline.....A	3.73	36.54	51.24	8.49	2.87					7,290	13,122			Mines..	193
	B		37.95	53.23	8.82	2.98					7,572	13,630				
Lawrence...	Aid.....A	7.85	32.90	47.07	12.18	2.66	63.03	5.09	15.79	1.25	6,305	11,349			Ohio...	9
	B		35.70	51.08	13.22	2.89	68.40	4.58	9.56	1.35	6,842	12,316				
Lawrence...	Aid.....A	8.37	31.80	51.60	8.23	1.29	66.94	5.21	17.02	1.31	6,596	11,873			Ohio...	9
	B		34.70	56.32	8.98	1.41	73.05	4.67	10.46	1.43	7,198	12,956				
Lawrence...	Aid.....A	8.45	31.25	49.02	11.28	0.93	65.20	5.10	16.21	1.28	6,405	11,529			Ohio...	9
	B		34.13	53.55	12.32	1.02	71.22	4.54	9.50	1.40	6,996	12,593				
Lawrence...	Lawrence....A	7.20	32.25	49.88	10.67	2.33	65.03	5.03	15.69	1.25	6,556	11,801			Ohio...	9
	B		34.75	53.75	11.50	2.51	70.07	4.56	10.01	1.35	7,065	12,717				
Lawrence...	Symmes.....A	8.77	31.70	50.82	8.71	0.76	66.88	5.32	17.08	1.25	6,586	11,855			Ohio...	9
	B		34.75	55.70	9.55	0.83	73.30	4.77	10.18	1.37	7,219	12,994				
Lawrence...	Symmes.....A	7.13	33.65	50.31	8.91	1.31	67.09	5.33	16.08	1.28	6,716	12,089			Ohio...	9
	B		36.23	54.17	9.60	1.41	72.24	4.89	10.49	1.37	7,231	13,016				
Lawrence...	Symmes.....A	8.38	31.45	50.08	10.09	1.84	64.90	5.18	16.72	1.27	6,497	11,695			Ohio ..	9
	B		34.33	54.66	11.01	2.01	70.83	4.64	10.12	1.39	7,091	12,764				
Muskingum.	Brush Creek..A	4.72	43.47	44.25	7.56	5.00	68.27	5.55	12.30	1.32	7,046	12,683			Ohio...	9
	B		45.62	46.45	7.93	5.25	71.65	5.28	8.51	1.38	7,395	13,311				
Muskingum.	Harrison.....A	4.27	45.63	41.07	9.03	5.23	67.98	5.36	11.28	1.12	6,967	12,541	1,985	2,082	Ohio...	21
	B		47.67	42.90	9.43	5.46	71.01	5.11	7.82	1.17	7,278	13,100				
Muskingum.	Harrison.....A	4.89	42.35	44.98	7.78	4.36	67.74	5.53	13.42	1.17	6,944	12,499			Ohio...	9
	B		44.53	47.29	8.18	4.58	71.22	5.25	9.54	1.23	7,301	13,142				
Muskingum.	Perry.....A	9.28	38.90	43.63	8.19	3.62	65.71	5.60	15.91	0.97	6,584	11,851	2,057	2,107	Ohio...	21
	B		42.88	48.09	9.03	3.99	72.43	5.04	8.44	1.07	7,257	13,063				
Muskingum.	Wayne.....A	5.11	35.50	46.79	12.60	3.84	64.81	5.11	12.39	1.25	6,558	11,804			Ohio...	9
	B		37.41	49.31	13.28	4.05	68.30	4.78	8.27	1.32	6,911	12,440				

TABLE OF ANALYSES OF OHIO COALS—Continued

UPPER FREEPORT OR No. 7 COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Noble	Noble	A	4.77	37.06	50.33	7.84	2.43	71.57	5.26	11.49	1.41	7,028	12,651	2,053	2,112	Ohio	
		B		38.92	52 85	8.23	2.55	75.15	4.97	7.62	1.48	7,380	13,28				
Noble	Noble	A	4.88	37.76	48.93	8.43	2.95					7,073	12,731			Mines	85
		B		39.70	51.44	8.86	3.10					7,436	13,385				
		A	5.13	37.17	49.59	8.11	2.99					7,053	12,695			Mines	85
		B		39.18	52.27	8.55	3.15					7,435	13,383				
		A	5.15	37.34	49.00	8.51	2.94	70.51	5.42	11.12	1.50	7,074	12,733			Mines	85
		B		39.37	51.66	8.97	3.10	74.34	5.12	6.89	1.58	7,459	13,426				
Tuscarawas	Mill	A	6.32	37.66	49.48	6.54	2.91	70.78	5.26	13.08	1.43	6,985	12,573	2,316	2,442	Ohio	
		B		40.20	52.82	6.98	3.11	75.56	4.87	7.95	1.53	7,456	13,421				
Tuscarawas	Rush	A	6.38	39.69	47.02	6.91	3.13	69.42	5.35	13.80	1.39	7,005	12,609	2,323	2,460	Ohio	
		B		42.39	50.22	7.39	3.34	74.15	4.96	8.68	1.48	7,356	13,240				
	Average	A	5.65	36.47	49.70	8.18	2.65	69.28	5.30	13.00	1.34	7,006	12,611	2,310	2,413		
		B		38.63	52.70	8.67	2.80	73.56	4.94	8.31	1.42	7,422	13,359				

Average of ash for samples with complete analyses is 8.43 per cent as received and 8.97 per cent moisture free.

MAHONING COAL

Columbiana.	Madison.....A	3.18	36.47	52.21	8.14	1.53	72.92	5.31	10.76	1.34	7,347	13,224	2,251	2,360	Ohio... 28
	B		37.67	53.92	8.41	1.58	75.31	5.13	8.18	1.39	7,587	13,657			
Columbiana.	Middleton....A	3.22	36.76	52.38	7.64	1.98	73.10	5.26	10.60	1.42	7,424	13,363	2,094	2,179	Ohio... 28
	B		37.98	54.13	7.89	2.05	75.54	5.07	7.98	1.47	7,614	13,705			
Columbiana.	Yellow Creek.A	3.15	39.32	51.15	6.38	3.55	75.35	5.56	7.81	1.35	7,548	13,586			Mines.. 193
	B		40.60	52.81	6.59	3.67	77.80	5.38	5.17	1.39	7,793	14,027			
Jefferson ...	Island Creek'.A	3.89	36.46	52.25	7.40	3.63									Mines.. 22
	B		37.94	54.36	7.70	3.78									
	Average.....A	3.36	37.25	52.00	7.39	2.35	73.79	5.38	9.72	1.37	7,440	13,391	2,172	2,269	
	B		38.55	53.80	7.65	2.43	76.21	5.19	7.12	1.42	7,665	13,796			

Average of ash for samples with complete analyses is 7.39 per cent as received and 7.63 per cent moisture free.

WILGUS COAL

Lawrence...	Mason.....A	6.95	39.08	46.42	7.55	3.60	66.83	5.43	15.26	1.33	6,649	11,968	2,180	2,345	Ohio...
	B		42.00	49.89	8.11	3.87	71.82	5.01	9.76	1.43	7,145	12,862			
Lawrence...	Symmes.....A	8.15	38.48	45.90	7.47	2.83	66.18	5.40	16.84	1.28	6,575	11,835	2,098	2,345	Ohio...
	B		41.89	49.98	8.13	3.08	72.05	4.89	10.46	1.39	7,158	12,885			
	Average.....A	7.55	38.78	46.16	7.51	3.22	66.51	5.41	16.05	1.30	6,612	11,902	2,139	2,345	
	B		41.95	49.93	8.12	3.47	71.94	4.95	10.11	1.41	7,152	12,874			

TABLE OF ANALYSES OF OHIO COALS—Continued

ANDERSON COAL

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Guernsey...	Valley.....	A	4.33	40.21	45.07	10.39	3.75	68.30	5.37	10.69	1.50	6,940	12,492			USGS..	621
		B		42.03	47.11	10.86	3.92	71.39	5.11	7.15	1.57	7,254	13,057				
Muskingum.	Harrison.....	A	5.66	42.72	39.92	11.70	4.88	63.61	5.30	13.48	1.03	6,579	11,842	2,014	2,199	Ohio...	21
		B		45.28	42.32	12.40	5.17	67.43	4.95	8.96	1.09	6,974	12,552				
Muskingum.	Salt Creek....	A	6.61	39.84	44.96	8.59	2.08	68.90	5.61	13.50	1.32	6,854	12,337			Ohio...	21
		B		42.66	48.14	9.20	2.22	73.77	5.23	8.17	1.41	7,339	13,210				
	Average.....	A	5.53	40.92	43.32	10.23	3.57	66.93	5.43	12.56	1.28	6,791	12,224				
		B		43.32	45.86	10.82	3.77	70.86	5.10	8.09	1.36	7,189	12,940				

HARLEM COAL

Carroll.....	Lee.....	A	7.07	36.55	50.34	6.04	0.57	71.04	5.49	15.64	1.22	7,025	12,645	2,626	2,710	Ohio...	
		B		39.33	54.17	6.50	0.61	76.44	5.08	10.06	1.31	7,559	13,606				

Athens	Alexander	A	7.13	41.51	42.09	9.27	4.52	64.40	5.40	15.45	0.96	6,559	11,807	2,345	2,458	Ohio	
		B		44.70	45.32	9.98	4.87	69.34	4.97	9.81	1.03	7,062	12,713				
Athens	Bern	A	5.87	41.93	43.39	8.81	4.01	67.06	5.35	13.72	1.05	6,806	12,251	2,330	2,430	Ohio	
		B		44.54	46.10	9.36	4.26	71.24	5.00	9.02	1.12	7,230	13,015				
Athens	Bern	A	6.31	43.16	42.95	7.58	3.75	67.28	5.49	14.38	1.52	6,879	12,383	2,330	2,430	Ohio	
		B		46.07	45.84	8.09	4.00	71.81	5.11	9.37	1.62	7,342	13,217				
Athens	Bern	A	5.78	37.43	48.79	8.00	4.19	67.55	5.14	14.17	0.95	6,833	12,299			Ohio	9
		B		39.73	51.78	8.49	4.45	71.69	4.78	9.58	1.01	7,252	13,053				
Athens	Bern	A	3.62	44.84	44.69	6.85	3.74					6,980	12,564				
		B		46.52	46.37	7.11	3.88					7,242	13,036				
		A	3.70	43.85	44.61	7.84	4.24					6,949	12,508				
		B		45.53	46.33	8.14	4.40					7,216	12,989				
Athens	Bern	A	5.94	40.15	45.26	8.65	3.35	67.82	5.32	13.58	1.28	6,774	12,194	2,374	2,416	Ohio	
		B		42.68	48.12	9.20	3.56	72.10	4.96	8.82	1.36	7,202	12,964				
Athens	Bern	A	5.66	43.96	43.52	6.86	4.10	68.25	5.46	14.25	1.08	6,939	12,491	2,300	2,416	Ohio	
		B		46.60	46.13	7.27	4.35	72.34	5.12	9.78	1.14	7,355	13,240				
Athens	Bern	A	6.60	35.05	48.15	10.20	3.41	66.61	5.13	13.72	0.93	6,607	11,893			Ohio	9
		B		37.53	51.55	10.92	3.65	71.32	4.71	8.40	1.00	7,074	12,733				
		A	4.51	38.24	45.76	11.49	4.88	65.92	5.10	11.62	0.99	6,636	11,945			Ohio	9
		B		40.05	47.92	12.03	5.11	69.03	4.82	7.97	1.04	6,949	12,508				
Athens	Canaan	A	7.37	39.02	42.53	11.08	4.20					6,407	11,533	2,285	2,444	Ohio	
		B		42.12	45.92	11.96	4.54					6,917	12,451				
Athens	Lodi	A	6.73	41.20	40.99	11.08	2.78	64.57	5.34	15.10	1.13	6,500	11,700	2,190	2,402	Ohio	
		B		44.17	43.95	11.88	2.98	69.23	4.92	9.78	1.21	6,969	12,544				
Athens	Lodi	A	8.52	39.15	42.44	9.89	3.06	64.19	5.41	15.85	1.60	6,442	11,595	2,205	2,444	Ohio	
		B		42.79	46.40	10.81	3.34	70.17	4.87	9.06	1.75	7,042	12,675				

TABLE OF ANALYSES OF OHIO COALS—Continued

PITTSBURGH OR No. 8 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Belmont	Colerain	A	3.79	36.37	50.84	9.00	4.16	70.41	5.14	10.20	1.09	7,145	12,861			Ohio	9
		B		37.80	52.84	9.36	4.32	73.18	4.91	7.10	1.13	7,426	13,367				
Belmont	Flushing	A	4.23	36.34	50.22	9.21	4.17	68.75	5.14	11.64	1.09	7,003	12,605			Ohio	9
		B		37.94	52.44	9.62	4.35	71.78	4.88	8.23	1.14	7,312	13,162				
Belmont	Flushing	A	1.9	39.2	49.5	9.4	4.7					7,194	12,950			Mines	
		B		39.9	50.5	9.6	4.8					7,328	13,190				
Belmont	Kirkwood	A	3.75	37.99	47.42	10.84	4.76	67.41	5.09	10.79	1.11	6,865	12,357			Ohio	9
		B		39.47	49.27	11.26	4.95	70.04	4.85	7.75	1.15	7,132	12,838				
Belmont	Mead	A	2.91	37.94	51.15	8.00	4.31	72.95	5.11	8.59	1.04	7,340	13,212			Ohio	9
		B		39.08	52.68	8.24	4.44	75.13	4.93	6.19	1.07	7,560	13,608				
Belmont	Pease	A	4.0	39.6	48.3	8.1	3.4					7,222	13,000	2,040		Mines	Tech. Paper 344
		B		41.3	50.3	8.4	3.5					7,523	13,541				
		A	3.9	38.9	48.0	9.2	3.6					7,144	12,860	2,040		Mines	Tech. Paper 344
		B		40 5	49.9	9.6	3.7					7,434	13,381				
		A	3.9	38.7	49.3	8.1	3.3					7,244	13,040	2,040		Mines	Tech. Paper 344
		B		40.3	51.3	8.4	3.4					7,538	13,569				
		A	3.9	39.6	48.0	8.5	3.4	71.2	5.3	10.3	1.3	7,200	12,960			Mines	Tech. Paper 344
		B		41.2	49.9	8.9	3.6	74.1	5.0	7.0	1.4	7,492	13,486				

Belmont....	Pease.....A	3.39	36.84	51.91	7.86	2.97	71.45	5.21	11.27	1.24	7,217	12,991			Ohio...	9
	B		38.13	53.73	8.14	3.07	73.95	5.01	8.55	1.28	7,470	13,446				
Belmont....	Pultney.....A	3.80	37.18	50.07	8.95	4.27	70.57	5.23	9.78	1.20	7,103	12,785			Ohio...	9
	B		38.65	52.05	9.30	4.44	73.36	5.00	6.65	1.25	7,383	13,289				
Belmont....	Pultney.....A	3.99	38.77	49.17	8.07	3.49					7,279	13,102			USGS..	290
	B		40.38	51.22	8.40	3.64					7,582	13,648				
	A	4.06	39.45	50.05	6.44	3.35									USGS..	290
	B		41.12	52.17	6.71	3.49										
Belmont....	Pultney.....A	3.51	38.65	50.98	6.86	3.76	72.06	5.45	10.70	1.17	7,325	13,185			Ohio...	9
	B		40.06	52.83	7.11	3.90	74.68	5.24	7.86	1.21	7,591	13,664				
Belmont....	Pultney.....A	3.32	40.80	49.11	6.77	3.55									USGS..	332
	B		42.20	50.80	7.00	3.67										
	A	3.10	40.76	50.11	6.03	3.42					7,553	13,595			USGS..	332
	B		42.06	51.72	6.22	3.53					7,795	14,031				
Belmont....	Smith.....A	3.21	36.82	52.71	7.26	4.28	71.4	5.14	10.77	1.06	7,297	13,135			Ohio...	9
	B		38.04	54.46	7.50	4.42	73.80	4.95	8.18	1.09	7,539	13,570				
Belmont....	Smith.....A	6.00	41.19	43.99	8.82	4.32	69.02	5.76	10.92	1.16	6,990	12,583	1,994	2,107	Ohio...	
	B		43.82	46.80	9.38	4.60	73.42	5.42	5.95	1.23	7,436	13,386				
Belmont....	Somerset.....A	3.72	41.01	45.78	9.49	4.57					7,089	12,760			USGS..	621
	B		42.59	47.55	9.86	4.75					7,363	13,253				
Belmont....	Somerset.....A	4.08	37.08	48.23	10.61	4.95	68.77	4.89	9.68	1.10	6,931	12,476			Ohio...	9
	B		38.66	50.28	11.07	5.16	71.69	4.63	6.31	1.15	7,226	13,006				
Belmont....	Union.....A	4.22	41.86	44.00	9.92	4.56					6,973	12,551	1,994	2,10	Ohio...	
	B		43.70	45.94	10.36	4.76					7,280	13,104				
Belmont....	Union .....A	4.46	36.00	48.78	10.76	4.45	68.24	4.85	10.60	1.10	6,903	12,425			Ohio...	9
	B		37.68	51.06	11.26	4.66	71.42	4.56	6.95	1.15	7,225	13,005				

TABLE OF ANALYSES OF OHIO COALS—Continued

PITTSBURGH OR No. 8 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Belmont	Warren	A	4.47	37.53	46.99	11.01	4.67	67.64	5.17	10.43	1.08	6,875	12,375			Ohio	
		B		39.29	49.19	11.52	4.89	70.80	4.90	6.76	1.13	7,196	12,953				
Belmon	Warren	A	4.13	42.71	43.83	9.33	4.46					7,074	12,733			USGS.	621
		B		44.55	45.72	9.73	4.65					7,379	13,282				
		A	3.72	43.25	44.40	8.63	4.45					7,193	12,947			USGS.	621
		B		44.92	46.12	8.96	4.62					7,471	13,447				
		A	3.88	43.09	43.96	9.07	4.36	69.97	5.46	9.87	1.27	7,132	12,838			USGS.	621
		B		44.83	45.73	9.44	4.54	72.80	5.23	6.67	1.32	7,420	13,356				
Belmont	Washington	A	2.79	37.88	49.91	9.42	5.09	69.76	5.25	9.39	1.09	7,215	12,987			Ohio	9
		B		38.97	51.34	9.69	5.24	71.76	5.08	7.11	1.12	7,422	13,360				
Belmont	Wheeling	A	4.25	33.53	51.87	10.35	3.95	68.17	5.19	11.25	1.09	6,903	12,425			Ohio	9
		B		35.02	54.17	10.81	4.13	71.19	4.93	7.80	1.14	7,209	12,976				
Belmont	Wheeling	A	3.96	38.09	48.91	9.04	4.25									USGS.	332
		B		39.65	50.94	9.41	4.43										
		A	4.13	39.22	48.69	7.96	4.15					7,271	13,088			USGS.	332
		B		40.91	50.79	8.30	4.30					7,584	13,651				
Belmont	York	A	2.26	42.63	48.43	6.68	3.18	74.24	5.20	9.30	1.40	7,456	13,421	2,500	2,554	Ohio	
		B		43.62	49.55	6.83	3.26	75.95	5.06	7.47	1.43	7,628	13,731				

Belmont....	York.....A	3.11	41.81	47.74	7.34	3.45					7,306	13,152	2,360	2,437	Ohio...	
	B		43.15	49.28	7.57	3.56					7,540	13,574				
Gallia.....	Green.....A	6.73	34.34	45.90	13.03	4.37	62.30	5.11	14.05	1.14	6,356	11,441			Ohio...	9
	B		36.82	49.21	13.97	4.68	66.80	4.68	8.65	1.22	6,814	12,266				
Gallia.....	Harrison.....A	6.98	36.14	47.85	9.03	5.21	64.91	5.24	14.60	1.01	6,583	11,849			Ohio...	9
	B		38.85	51.44	9.71	5.60	69.77	4.81	9.03	1.08	7,076	12,737				
Gallia.....	Harrison.....A	7.83	34.15	48.26	9.76	3.89	64.59	5.18	15.49	1.09	6,544	11,779			Ohio...	9
	B		37.05	52.36	10.59	4.22	70.07	4.68	9.26	1.18	7,099	12,778				
Gallia.....	Ohio.....A	5.80	36.76	47.38	10.06	4.34	64.94	5.16	14.40	1.10	6,551	11 792			Ohio...	9
	B		39.02	50.30	10.68	4.60	68.94	4.80	9.81	1.17	6,954	12,517				
Guernsey...	Millwood....A	4.5	40.6	46.6	8.3	4.6	70.3	5.4	10.3	1.1	7,111	12,800			Mines .	
	B		42.5	48.8	8.7	4.9	73.6	5.2	6.4	1.2	7,444	13,400				
	A	3.9	39.8	46.8	9.5	4.9	69.9	5.2	9.3	1.2	7,028	12,650			Mines..	
	B		41.5	48.6	9.9	5.1	72.7	5.0	6.1	1.2	7,311	13,160				
	A	4.7	40.4	46.3	8.6	4.2					7,072	12,730			Mines.	
	B		42.4	48.5	9.1	4.4					7,422	13,360				
	A	4.3	40.3	46.5	8.9	4.6	72.9	5.5	6.9	1.2	7,072	12,730			Mines.	
	B		42.1	48.6	9.3	4.8	76.1	5.2	3.3	1.3	7,389	13,300				
Guernsey...	Millwood.....A	4.36	41.14	45.76	8.74	4.85	69.30	5.37	10.48	1.26	7,061	12,710			USGS..	621
	B		43.02	47.84	9.14	5.07	72.46	5.11	6.90	1.32	7,383	13,289				
Harrison....	Athens.....A	5.98	34.35	53.70	5.97	1.35	72.22	5.44	13.71	1.31	7,202	12,964			Ohio...	9
	B		36.53	57.12	6.35	1.44	76.81	5.08	8.93	1.39	7,660	13,788				
Harrison....	Cadiz.....A	3.83	36.70	48.59	10.88	4.38	67.70	5.09	10.68	1.27	6,864	12,355			Ohio...	9
	B		38.16	50.53	11.31	4.55	70.40	4.85	7.57	1.32	7,137	12,847				
Harrison....	Short Creek..A	4.18	36.95	50.65	8.22	2.83	71.20	5.36	11.13	1.26	7,160	12,888			Ohio...	9
	B		38.56	52.86	8.58	2.95	74.31	5.11	7.74	1.31	7,472	13,450				

TABLE OF ANALYSES OF OHIO COALS—Continued

PITTSBURGH OR No. 8 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Harrison....	Short Creek..	A	6.54	35.48	51.24	6.74	2.19	70.49	5.70	13.66	1.22	7,061	12,710			Ohio...	9
		B		37.96	54.83	7.21	2.34	75.42	5.32	8.40	1.31	7,555	13,599				
Jefferson....	Cross Creek..	A	5.19	34.69	50.67	9.45	2.38									USGS	Prof. Paper 48
		B		36.59	53.44	9.97	2.51										
Jefferson....	Knox.....	A	3.37	37.86	48.78	9.99	3.94					7,178	12,920			Mines..	193
		B		39.17	50.49	10.34	4.08					7,429	13,372				
Jefferson....	Knox.....	A	3.18	38.11	49.35	9.36	4.02					7,187	12,937			Mines..	193
		B		39.36	50.97	9.67	4.15					7,423	13,361				
Jefferson....	Mt. Pleasant.	A	3.10	37.92	49.46	9.52	3.83	69.56	5.22	10.77	1.10	7,153	12,875			Ohio...	9
		B		39.13	51.04	9.83	3.95	71.78	5.04	8.27	1.13	7,382	13,287				
Jefferson....	Smithfield....	A	5.45	35.73	54.22	4.60	0.84					7,401	13,322			Mines..	85
		B		37.79	57.35	4.86	0.89					7,827	14,089				
Jefferson....	Smithfield....	A	5.47	35.77	53.28	5.48	0.77					7,324	13,183			Mines..	85
		B		37.84	56.36	5.80	0.81					7,748	13,946				
Jefferson....	Smithfield....	A	4.87	36.63	51.25	7.25	2.60	71.91	5.36	11.50	1.38	7,218	12,992			Mines..	85
		B		38.51	53.87	7.62	2.73	75.59	5.07	7.54	1.45	7,588	13,658				
Jefferson....	Smithfield....	A	4.06	38.49	49.70	7.75	3.67					7,304	13,147			USGS..	290
		B		40.12	51.80	8.08	3.82					7,613	13,703				

		A	4.20	37.16	51.13	7.51	3.22								USGS..	290
		B		38.79	53.37	7.84	3.36									
Jefferson....	Smithfield....	A	4.96	34.51	54.08	6.45	1.75	72.43	5.37	12.67	1.33	7,277	13,099		Ohio...	9
		B		36.31	56.90	6.79	1.84	76.21	5.07	8.69	1.40	7,656	13,781			
Jefferson....	Smithfield....	A	4.30	35.28	52.54	7.88	3.01	71.34	5.18	11.39	1.20	7,144	12,859		Ohio...	9
		B		36.87	54.90	8.23	3.15	74.55	4.91	7.91	1.25	7,465	13,437			
Jefferson....	Steubenville..	A	6.55	34.48	50.36	8.61	2.52								Mines..	22
		B		36.90	53.89	9.21	2.70									
Jefferson....	Warren.....	A	4.69	35.57	53.73	6.01	1.54					7,403	13,325		USGS..	290
		B		37.32	56.37	6.31	1.62					7,767	13,981			
		A	4.99	35.33	53.98	5.70	0.95								USGS..	290
		B		37.18	56.82	6.00	1.00									
Jefferson....	Warren.....	A	4.57	32.40	54.03	9.00	1.55	71.18	5.06	11.89	1.32	7,105	12,789		Ohio...	9
		B		33.95	56.62	9.43	1.62	74.59	4.77	8.21	1.38	7,445	13,401			
Jefferson....	Warren.....	A	3.13	37.88	50.77	8.22	4.02	71.03	5.38	10.09	1.26	7,233	13,019		Ohio...	9
		B		39.10	52.41	8.49	4.15	73.32	5.19	7.55	1.30	7,466	13,439			
Jefferson....	Wayne.....	A	5.05	35.88	51.12	7.95	2.61	70.68	5.32	12.19	1.25	7,147	12,865		Ohio...	9
		B		37.79	53.84	8.37	2.75	74.44	5.01	8.11	1.32	7,527	13,549			
Jefferson....	Wayne.....	A	5.01	36.15	52.83	6.01	1.74					7,327	13,189		Mines..	85
		B		38.06	55.61	6.33	1.83					7,713	13,883			
		A	4.32	37.09	49.14	9.45	3.82					7,072	12,730		Mines..	85
		B		38.76	51.36	9.88	3.99					7,391	13,304			
		A	4.7	36.6	50.8	7.89	2.80	71.72	5.28	10.96	1.35	7,195	12,950		Mines..	85
		B		38.4	53.3	8.28	2.94	75.23	4.99	7.14	1.42	7,545	13,580			
Jefferson....	Wells.....	A	3.79	38.78	50.03	7.40	3.84					7,267	13,081		Mines..	85
		B		40.31	52.00	7.69	3.99					7,553	13,595			

TABLE OF ANALYSES OF OHIO COALS—Continued

PITTSBURGH OR No. 8 COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Jefferson ...	Wells	A	4.28	37.41	50.29	8.02	3.72					7,201	12,962			Mines..	85
		B		39.08	52.54	8.38	3.89					7,523	13,541				
		A	4.11	37.96	50.23	7.70	3.84	71.69	5.23	10.15	1.39	7,230	13,014			Mines..	85
		B		39.59	52.38	8.03	4.00	74.77	4.97	6.78	1.45	7,540	13,572				
Jefferson....	Wells.....	A	4.89	33.10	51.55	10.46	4.09	68.01	5.03	11.29	1.12	6,953	12,515			Ohio...	9
		B		34.80	54.20	11.00	4.30	71.51	4.72	7.30	1.17	7,310	13,158				
Jefferson....	Wells.....	A	5.27	34.87	49.16	10.70	3.07									USGS.	Prof. Paper 48
		B		36.81	51.90	11.29	3.24										
Jefferson....	Wells.....	A	4.78	35.93	53.98	5.31	0.98	74.13	5.35	12.77	1.46	7,417	13,351			Mines..	85
		B		37.73	56.69	5.58	1.03	77.85	5.06	8.95	1.53	7,789	14,020				
Jefferson....	Wells.....	A	4.52	36.40	51.10	7.98	3.33					7,157	12,883			Mines..	85
		B		38.12	53.52	8.36	3.49					7,496	13,493				
Jefferson....	Wells.....	A	4.26	36.61	52.18	6.95	2.57					7,307	13,153			Mines..	85
		B		38.24	54.50	7.26	2.68					7,632	13,738				
Meigs.....	Bedford.....	A	5.43	42.40	41.19	10.98	6.80					6,517	11,731			Ohio...	
		B		44.83	43.56	11.61	7.19					6,891	12,404				
Meigs.....	Bedford.....	A	21.45	32.49	36.80	9.26	1.64	48.91	5.32	33.82	1.05	4,540	8,173	2,300	2,430	Ohio...	
		B		41.36	46.85	11.79	2.09	62.26	3.75	18.77	1.34	5,781	10,407				

Morgan	Homer	A	6.87	40.55	44.39	8.19	4.22	67.39	5.32	13.98	0.90	6,722	12,100			Ohio...	9
		B		43.54	47.67	8.79	4.53	72.36	4.90	8.46	0.96	7,218	12,992				
Morgan	Homer	A	4.80	42.22	43.03	9.95	5.19					6,600	11,880			Ohio...	
		B		44.35	45.20	10.45	5.45					6,933	12,479				
Muskingum	Union	A	6.71	40.17	41.98	11.14	5.20					6,496	11,693	1,944	2,107	Ohio...	
		B		43.06	45.00	11.94	5.58					6,963	12,534				
	Average	A	4.83	38.24	48.35	8.58	3.72	68.77	5.26	12.22	1.20	7,006	12,611	2,246	2,370		
		B		40.08	50.90	9.02	3.92	72.49	4.94	8.07	1.25	7,356	13,243				

Average of ash for samples with complete analyses is 8.83 per cent as received and 9.33 per cent moisture free.

THE POMEROY OR No. 8a COAL

Gallia	Cheshire	A	8.21	34.23	46.10	11.46	2.18	62.95	5.48	16.91	1.02	6,387	11,497			Ohio...	9
		B		37.29	50.22	12.49	2.37	68.58	4.98	10.47	1.11	6,958	12,524				
Meigs	Bedford	A	7.02	39.70	42.87	10.41	6.16					6,463	11,634	2,430	2,486	Ohio...	
		B		42.70	46.11	11.19	6.63					6,951	12,512				
Meigs	Rutland	A	7.63	33.33	48.11	10.93	1.83	65.29	5.20	15.72	1.03	6,512	11,722			Ohio...	9
		B		36.08	52.09	11.83	1.98	70.68	4.71	9.68	1.12	7,050	12,690				
Meigs	Salisbury	A	7.33	34.59	49.39	8.69	2.05	66.71	5.53	15.96	1.06	6,725	12,105			Ohio...	9
		B		37.32	53.30	9.38	2.21	71.99	5.09	10.19	1.14	7,257	13,062				
Meigs	Salisbury	A	7.22	32.82	50.67	9.29	1.32	66.47	5.39	16.43	1.10	6,668	12,002			Ohio...	9
		B		35.38	54.61	10.01	1.42	71.64	4.95	10.79	1.19	7,187	12,936				
Meigs	Salisbury	A	6.05	41.96	43.76	8.23	2.61					6,857	12,342			Ohio...	
		B		44.66	46.58	8.76	2.78					7,298	13,136				
Meigs	Salisbury	A	5.51	38.19	45.72	10.58	4.17	65.55	5.40	13.35	0.95	6,661	11,990			Ohio...	9
		B		40.42	48.38	11.20	4.41	69.37	5.07	8.94	1.01	7,049	12,688				

TABLE OF ANALYSES OF OHIO COALS—Continued

THE POMEROY OR No. 8a COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Meigs	Sutton	A	4.85	36.28	46.35	12.52	2.94	65.29	5.32	12.76	1.17	6,624	11,923			Ohio...	9
		B		38.13	48.71	13.16	3.09	68.62	5.02	8.88	1.23	6,962	12,531				
	Average	A	6.72	36.39	46.62	10.27	2.41	65.38	5.39	15.19	1.05	6,612	11,902				
		B		39.00	50.00	11.00	2.58	70.15	4.97	9.82	1.13	7,089	12,760				

Average of ash for samples with complete analyses is 10.58 per cent as received and 11.35 per cent moisture free.

FISHPOT OR LOWER MEIGS CREEK COAL

Belmont	Mead	A	2.54	40.81	40.92	15.73	5.00					6,522	11,739	2,190	2,300	Ohio...	
		B		41.87	41.99	16.14	5.13					6,692	12,045				
Monroe	Malaga	A	5.16	37.73	37.49	19.62	5.19	59.61	5.02	9.61	0.95	6,068	10,922	2,116	2,210	Ohio...	
		B		39.78	39.53	20.69	5.48	62.85	4.70	5.28	1.00	6,398	11,516				
	Average	A	3.85	39.27	39.21	17.67	5.19					6,295	11,330	2,153	2,255		
		B		39.00	50.00	11.00	5.48					6,545	11,780				

Belmont....	Flushing.....A	4.98	33.30	48.90	12.82	2.41	66.31	4.95	12.32	1.19	6,652	11,974			Ohio...	9
	B		35.05	51.46	13.49	2.53	69.79	4.63	8.31	1.25	7,001	12,602				
Belmont....	Flushing.....A	4.63	33.84	52.50	9.03	2.18									Mines..	22
	B		35.48	55.05	9.47	2.29										
Belmont ...	Goshen.....A	4.23	36.41	47.91	11.45	3.16									Mines..	22
	B		38.02	50.02	11.96	3.30										
Belmont....	Goshen.....A	3.40	35.72	45.94	14.94	4.39	64.77	4.86	9.96	1.08	6,578	11,840			Ohio...	9
	B		36.98	47.56	15.46	4.54	67.05	4.64	7.19	1.12	6,809	12,256				
Belmont....	Pease.....A	4.65	36.19	42.97	16.19	3.13	62.63	4.72	12.07	1.26	6,265	11,278	2,300	2,374	Ohio...	
	B		37.95	45.07	16.98	3.28	65.68	4.41	8.33	1.32	6,571	11,828				
Belmont....	Pultney.....A	4.13	39.58	42.47	13.82	3.38	65.61	5.03	10.95	1.21	6,584	11,852	2,170	2,270	Ohio...	
	B		41.29	44.30	14.41	3.52	68.44	4.77	7.60	1.26	6,868	12,363				
Belmont....	Pultney.....A	3.88	38.84	43.96	13.32	2.71					6,643	11,958	2,285	2,360	Ohio...	
	B		40.41	45.73	13.86	2.82					6,911	12,441				
Belmont....	Richland.....A	4.67	39.86	43.26	12.21	3.36					6,672	12,010	2,285	2,360	Ohio...	
	B		41.81	45.38	12.81	3.52					6,999	12,598				
Belmont....	Richland.....A	5.51	38.18	44.01	12.30	2.60					6,642	11,956	2,300	2,374	Ohio...	
	B		40.41	46.57	13.02	2.75					7,029	12,653				
Belmont....	Smith.....A	3.52	34.74	49.90	11.84	3.67	67.36	5.02	11.06	1.05	6,884	12,391			Ohio...	9
	B		36.01	51.72	12.27	3.80	69.82	4.80	8.22	1.09	7,135	12,843				
Belmont....	Union.....A	4.31	32.47	51.54	11,68	1.94	68.32	5.09	11.86	1.11	6,837	12,307			Ohio...	9
	B		33.93	53.86	12.21	2.03	71.40	4.82	8.39	1.15	7,145	12,861				
Belmont....	Union.....A	4.17	35.09	51.14	9.60	3.11	69.90	4.97	11.33	1.09	7,001	12,602			Ohio...	9
	B		36.62	53.36	10.02	3.24	72.94	4.70	7.96	1.14	7,306	13,150				
Belmont....	Warren.....A	4.34	38.95	45.50	11.21	3.65	68.17	5.31	10.46	1.20	6,890	12,402			USGS..	621
	B		40.72	47.56	11.72	3.82	71.26	5.05	6.90	1.25	7,203	12,965				

TABLE OF ANALYSES OF OHIO COALS—Continued

THE MEIGS CREEK (SEWICKLEY) OR No. 9 COAL—Continued

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Belmont	Warren	A	4.47	35.31	47.15	13.07	3.27	65.83	4.99	11.71	1.13	6,668	12,002			Ohio	9
		B		36.96	49.36	13.68	3.42	68.91	4.71	8.10	1.18	6,980	12,564				
Belmont	Washington	A	3.51	37.15	41.53	17.81	4.05					6,396	11,513			USGS.	621
		B		38.50	43.04	18.46	4.20					6,629	11,932				
Belmont	Wayne	A	4.21	39.51	43.86	12.42	2.81					6,786	12,214	2,330	2,430	Ohio	
		B		41.25	45.78	12.97	2.94					7,084	12,751				
Belmont	Wheeling	A	7.52	31.75	49.49	11.24	2.11	66.41	5.14	13.99	1.11	6,589	11,860			Ohio	9
		B		34.33	53.52	12.15	2.28	71.81	4.65	7.90	1.21	7,125	12,824				
Belmont	York	A	3.26	40.94	44.82	10.98	3.86	69.07	5.06	9.84	1.19	6,946	12,502	2,228	2,345	Ohio	
		B		42.32	46.34	11.34	4.00	71.39	4.86	7.18	1.23	7,180	12,923				
Harrison	Athens	A	5.35	33.09	51.27	10.29	2.20	68.67	5.21	12.38	1.25	6,885	12,393			Ohio	9
		B		34.96	54.17	10.87	2.32	72.55	4.88	8.06	1.32	7,274	13,093				
Harrison	Flushing	A	5.51	35.95	49.89	8.65	2.31									Mines.	22
		B		38.05	52.80	9.15	2.44										
Monroe	Perry	A	2.32	39.30	43.84	14.54	3.59	66.78	4.93	9.21	0.95	6,759	12,167	2,330	2,444	Ohio	
		B		40.23	44.89	14.88	3.68	68.37	4.78	7.32	0.97	6,920	12,456				
Morgan	Bristol	A	5.05	37.83	46.75	10.37	4.30	67.04	5.14	12.26	0.89	6,730	12,114			Ohio	9
		B		39.84	49.24	10.92	4.53	70.61	4.82	8.18	0.94	7,088	12,758				

Morgan	Manchester	A	4.07	37.61	47.66	10.66	5.07	66.19	5.10	12.11	0.87	6,779	12,202			Ohio	9
		B		39.21	49.68	11.11	5.29	69.00	4.84	8.85	0.91	7,067	12,720				
Morgan	Meigsville	A	5.13	36.07	47.06	11.74	4.89	64.77	5.06	12.67	0.87	6,625	11,925			Ohio	9
		B		38.02	49.60	12.38	5.15	68.27	4.73	8.55	0.92	6,983	12,569				
Muskingum	Bluerock	A	5.16	40.12	41.58	13.14	5.07	63.25	5.22	12.46	0.86	6,429	11,572	2,057	2,275	Ohio	21
		B		42.30	43.84	13.86	5.34	66.69	4.90	8.31	0.90	6,779	12,202				
Noble	Beaver	A	4.14	38.42	44.82	12.62	3.61	66.87	5.22	10.48	1.20	6,739	12,130			USGS	621
		B		40.08	46.75	13.17	3.77	69.76	4.97	7.08	1.25	7,030	12,654				
Noble	Brookfield	A	3.54	37.41	45.82	13.23	6.21	64.44	5.12	10.12	0.88	6,642	11,956			Ohio	9
		B		38.78	47.50	13.72	6.44	66.80	4.90	7.23	0.91	6,886	12,395				
Noble	Brookfield	A	4.85	37.28	48.05	9.82	5.59	66.01	5.26	12.35	0.97	6,834	12,301			Ohio	9
		B		39.18	50.50	10.32	5.87	69.37	4.96	8.47	1.01	7,182	12,928				
Noble	Center	A	4.62	41.13	44.01	10.24	4.17					6,791	12,224	2,416	2,486	Ohio	
		B		43.12	46.14	10.74	4.37					7,120	12,816				
Noble	Elk	A	3.06	38.43	46.18	12.33	6.00	66.18	5.11	9.52	0.86	6,865	12,357			Ohio	9
		B		39.64	47.64	12.72	6.19	68.27	4.92	7.01	0.89	7,082	12,747				
Noble	Enoch	A	3.86	44.91	39.62	11.61	5.35					6,836	12,304	2,444	2,500	Ohio	
		B		46.71	41.21	12.08	5.56					7,110	12,799				
Noble	Enoch	A	2.90	37.24	49.70	10.16	4.27	68.53	5.22	10.78	1.04	7,051	12,690			Ohio	9
		B		38.35	51.19	10.46	4.40	70.58	5.05	8.44	1.07	7,261	13,069				
Noble	Jackson	A	4.52	42.16	41.26	12.06	4.54	66.08	5.12	11.32	0.88	6,722	12,099	2,360	2,444	Ohio	
		B		44.16	43.21	12.63	4.75	69.21	4.84	7.65	0.92	7,040	12,672				
Noble	Marion	A	3.12	37.36	46.67	12.85	5.60	65.61	5.09	9.93	0.92	6,739	12,130			Ohio	9
		B		38.56	48.18	13.26	5.78	67.72	4.90	7.39	0.95	6,956	12,521				
Noble	Marion	A	3.57	41.53	44.37	10.53	4.87	68.15	5.25	10.09	1.11	6,947	12,505			USGS	621
		B		43.07	46.01	10.92	5.05	70.67	5.03	7.18	1.15	7,204	12,967				

TABLE OF ANALYSES OF OHIO COALS—Continued

THE MEIGS CREEK (SEWICKLEY) OR No. 9 COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Noble	Olive	A	4.36	41.06	41.26	13.32	4.73					6,574	11,833	2,116	2,210	Ohio	
		B		42.93	43.14	13.93	4.95					6,874	12,372				
Noble	Seneca	A	4.53	39.56	45.59	10.32	4.12	68.00	5.27	11.12	1.17	6,846	12,323			USGS	621
		B		41.44	47.75	10.81	4.32	71.22	5.00	7.42	1.23	7,171	12,908				
Noble	Stock	A	4.08	43.49	41.56	10.87	5.39	66.70	5.19	10.83	1.02	6,831	12,296	2,360	2,444	Ohio	
		B		45.34	43.33	11.33	5.62	69.54	4.95	7.50	1.06	7,122	12,820				
Noble	Stock	A	2.55	38.40	47.64	11.41	5.79	67.50	5.11	9.27	0.92	6,952	12,514			Ohio	9
		B		39.40	48.89	11.71	5.94	69.26	4.96	7.19	0.94	7,134	12,841				
Washington	Adams	A	2.95	37.47	46.69	12.89	5.55	65.88	5.05	9.71	0.92	6,803	12,245			Ohio	9
		B		38.61	48.11	13.28	5.72	67.88	4.86	7.31	0.95	7,010	12,617				
Washington	Aurelius	A	3.40	37.95	49.07	9.58	5.03	68.33	5.31	10.85	0.90	7,083	12,749			Ohio	9
		B		39.28	50.80	9.92	5.21	70.73	5.10	8.11	0.93	7,332	13,198				
	Average	A	4.20	37.84	46.03	11.93	4.22	66.65	5.10	11.10	1.04	6,750	12,150	2,284	2,380		
		B		39.50	48.04	12.46	4.39	69.50	4.85	7.78	1.08	7,042	12,676				

Average of ash for samples with complete analyses is 11.89 per cent as received and 12.40 per cent moisture free.

UNIONTOWN OR No. 10 COAL

Belmont....	Goshen.....A	4.70	34.21	45.75	15.34	2.85	63.71	4.95	11.82	1.33	6,479	11,662			USGS..	621
	B		35.90	48.00	16.10	2.99	66.85	4.65	8.01	1.40	6,799	12,238				
Belmont....	Goshen.....A	0.83	41.21	44.29	13.67	2.59					6,747	12,145	2,260	2,390	Ohio...	
	B		41.56	44.66	13.78	2.61					6,803	12,246				
Monroe.....	Adams.....A	2.57	40.87	42.82	13.74	3.06	65.96	4.83	11.04	1.37	6,573	11,831	2,044	2,105	Ohio...	
	B		41.95	43.94	14.11	3.15	67.68	4.73	8.93	1.40	6,746	12,143				
Monroe.....	Adams.....A	4.85	35.93	43.90	15.32	3.96	63.59	4.87	11.07	1.19	6,412	11,542			USGS..	621
	B		37.76	46.14	16.10	4.16	66.83	4.55	7.11	1.25	6,739	12,130				
	Average.....A	3.24	38.05	44.19	14.52	3.29	54.42	4.88	11.31	1.30	6,553	11,795	2,152	2,248		
	B		39.29	45.69	15.02	3.43	67.12	4.64	8.02	1.35	6,772	12,189				

Average of ash for samples with complete analyses is 14.80 per cent as received and 15.44 per cent moisture free.

WAYNESBURG OR No. 11 COAL

Belmont....	Colerain.....A	5.27	37.42	42.61	14.70	2.19	64.45	4.97	12.25	1.44	6,434	11,581	2,583	2,635	Ohio...	
	B		39.50	44.98	15.52	2.31	68.04	4.62	7.99	1.52	6,792	12,225				
Belmont....	Goshen.....A	4.31	35.32	44.15	16.22	3.53	64.10	4.98	9.97	1.20	6,447	11,605			USGS..	621
	B		36.91	46.14	16.95	3.69	66.98	4.70	6.43	1.25	6,737	12,127				
Belmont....	Mead.....A	3.51	37.68	41.94	16.87	3.59	63.18	4.70	10.41	1.25	6,320	11,377	2,360	2,430	Ohio...	
	B		39.05	43.47	17.48	3.72	65.48	4.47	7.56	1.29	6,550	11,791				
Belmont....	Richland.....A	3.68	37.36	45.89	13.07	1.75					6,678	12,020	2,554	2,635	Ohio...	
	B		38.78	47.65	13.57	1.82					6,933	12,479				
Belmont....	Smith.....A	5.72	35.86	44.31	14.11	2.50					6,439	11,590	2,145	2,251	Ohio...	
	B		38.03	47.01	14.96	2.65					6,830	12,293				

TABLE OF ANALYSES OF OHIO COALS—Concluded

WAYNESBURG OR No. 11 COAL—Concluded

County	Township		Moisture at 105°C.	Volatile Matter	Fixed Carbon	Ash	Sulphur	Carbon	Hydrogen	Oxygen	Nitrogen	Heating Value		Fusion of Ash (Degrees F.)		Reference	
												Calories	B. t. u.	Incipient	Complete	Organization	Bulletin
Belmont....	Smith.....	A	1.78	39.16	43.65	15.41	2.68	65.15	4.87	10.71	1.18	6,505	11,709	2,496	2,576	Ohio...	
		B		39.87	44.44	15.69	2.73	66.33	4.75	9.30	1.20	6,623	11,921				
Belmont....	Somerset.....	A	4.46	36.60	44.19	14.75	3.02	65.32	5.10	10.65	1.16	6,553	11,795			USGS..	621
		B		38.31	46.25	15.44	3.16	68.37	4.81	7.01	1.21	6,859	12,346				
Belmont....	Washington.	A	4.57	36.81	44.17	14.45	2.59					6,574	11,833			USGS..	621
		B		38.57	46.29	15.14	2.71					6,889	12,400				
Belmont....	Wayne.....	A	5.59	38.38	39.70	16.33	3.20					6,110	10,999	2,496	2,592	Ohio...	
		B		40.66	42.05	17.29	3.39					6,472	11,650				
Belmont....	Wayne.....	A	4.40	37.10	43.06	15.44	2.90					6,476	11,657			USGS..	621
		B		38.81	45.04	16.15	3.03					6,774	12,193				
Belmont....	York.....	A	2.84	40.07	43.75	13.34	4.91					6,526	11,746	2,390	2,490	Ohio...	
		B		41.24	45.03	13.73	5.06					6,716	12.089				
	Average.....	A	4.20	37.43	43.40	14.97	3.00	64.44	4.92	10.80	1.25	6,460	11,628	2,432	2,515		
		B		39.07	45.30	15.63	3.12	67.04	4.67	7.66	1.29	6,743	12,138				

Average of ash for samples with complete analyses is 15.59 per cent as received and 16.22 per cent moisture free.

WASHINGTON COAL

Belmont....	Washington..	A	4.08	33.69	41.23	21.00	2.86	59.93	4.76	10.36	1.09	6,012	10,822			USGS..	621
		B		35.12	42.98	21.90	2.98	62.48	4.49	7.01	1.14	6,268	11,282				

PART II

THE OHIO COAL SUPPLY AND ITS EXHAUSTION

AS OF JANUARY 1, 1927

BY
FRANK A. RAY

INTRODUCTION

The importance of coal in modern civilization cannot be overestimated. It offers to mankind solar energy in the most concentrated form. It is the father of modern civilization. The great coal producing nations of the world which have been developed by its use, viz., the United States, Great Britain, Germany, France, Austria, Belgium, Russia, and Japan, are the greatest commercial nations. The fires of industry and the centers of population in these countries cluster around their coal supplies. This supply is definite, and it is not inexhaustible. Every ton of coal taken out of the earth, or lost in mining, or wasted in using it, leaves just that much less for the future needs of the world.

The use of coal as a fuel began within the past hundred and twenty years. Its production in the United States in 1850 was 7,000,000 tons and in 1926 it was 662,727,452 tons. The Ohio production in 1850 was 704,000 tons and 68 years later it was 47,919,000 tons or nearly 68 times as great.

With such increases in the consumption of coal, the question of the future supply must give concern to all thoughtful men. All of the world's supply of coal has not yet been measured. It is doubtful if even the oldest and most civilized of the nations know the amount of their coal supply. Many years of careful explorations are yet needed to define the coal areas in all parts of the world. Marius R. Campbell of the United States Geological Survey estimates the original tonnage of coal in the United States to be 3,444,552,000,000 tons; the total coal production to 1926, 16,819,181,148 tons; and the amount of coal lost in mining 8,409,000,000 tons, making his estimate of total depletion of coal in the United States to be 25,228,181,148 tons, which would leave an available coal reserve at the end of 1925, of 3,419,323,818,852 tons.

Mr. Campbell estimates the original Ohio coal reserve to be 93,967,000,000 tons, and gives the amount of coal mined to 1926 as 1,082,817,138 tons and the amount of coal lost in mining as 541,408,569

tons, making the total coal reserve remaining at the end of 1925, 92,342,774,293 tons.

In the opinion of the writer, such estimates of the coal reserves at this time cannot be even approximately correct because of our meager knowledge of the coal beds on which all such estimates of coal reserves must be based.

In making an estimate of the original tonnage of minable coal in Ohio and the reserves at the end of 1926, the writer has considered only the coal beds that have been and are being mined in Ohio, the minimum thickness of any of the nine commercial beds being 2.7 feet of clean coal. These nine coal beds are considered to be minable under present mining practice and labor conditions. All of the important coal mines are shown as nearly as possible on the map of the mineral industries of Ohio, and this map together with reliable records of test drilling and measured sections of the coal beds in the mines have been used to define the areas of proved minable coal.

The thickness of clean coal used in the estimate of recoverable coal in the Ohio beds represents the average of a large number of measured sections of these beds, eliminating all dirt partings. The coal sections were compiled from reliable records of test drilling and from the records of the Geological Survey of Ohio.

In estimating the original coal tonnage in the Ohio reserve, 1,500 tons run-of-mine coal per acre foot has been used as the average thickness of clean coal. For the amount of depletion, it is assumed that 30 per cent of the coal mined has been lost in mining, which loss added to the loss percentage in the 1,500 tons per acre foot makes a total coal recovery of about 60 per cent. On these bases we find the original tonnage of coal in Ohio to be 14,399,296,000 tons run-of-mine coal; that 1,130,064,089 tons have been mined to January 1, 1927; and that 399,399,998 tons have been lost in mining, making a total coal depletion in Ohio of 1,529,464,087 tons, which deducted from the original coal tonnage gives a remaining recoverable tonnage as of January 1, 1927, of 12,869,831,913 tons run-of-mine coal. This is a little less than one-seventh of Mr. Campbell's estimate of the available Ohio coal reserve.

As the Ohio Department of Industrial Relations does not have production statistics according to the bed from which the coal is mined, it is impossible to show the amount that has been taken from each of the coal beds.

OHIO COMMERCIAL COAL DISTRICTS

The development of the present commercial coal fields in Ohio began in most cases with the building of the railroads into them. Some coal was shipped by canal in the early days, but the amount was small in comparison to that produced from the rail coal fields, developed later.

There are fifteen districts in the State in which coal is mined from one or more of the commercial beds.

WELLSTON–JACKSON–IRONTON FIELD

This field includes all of Jackson County, southeastern Vinton, the central northern part of Lawrence, and western Gallia counties. The coal beds that have been or are being mined range from the Sharon to the Upper Freeport. The production of coal from the Wellston and Ironton districts began with the completion of the C. H. & D., the D. T. & I., and the B. & O. S. W. railroads about 1880, and in the Jackson field coal has been produced for about sixty years. In the Wellston and Jackson district the producing beds are the No. 1 or Sharon, the No. 2 or Quakertown, No. 4 or Brookville, No. 4a or Clarion, and No. 5, Lower Kittanning.

HOCKING FIELD

The development of the Hocking thick and thin fields of Middle Kittanning coal began in a small way with the construction of the Hocking Valley branch of the Ohio Canal. The first mines were located at Chauncey and Nelsonville. The best market ac that time was the old Neil House at Columbus. The production of coal from this field did not reach any degree of importance until the building of the Hocking Valley Railroad to Nelsonville, in 1869, which was followed by the construction of the Straitsville branch a year later. The Shawnee branch of the B. & O. Railroad was completed to Shawnee in 1872; the Toledo & Ohio Central Railroad was completed to Corning about 1879; the Columbus, Shawnee, and Hocking Railroad was completed to Redfield and Cannelville in 1883; and the Kanawha and Michigan Railroad was built in 1882. The building of these railroads fixed the time that this field has been active at about 60 years.

The most of the coal production has been from the thick vein of Middle Kittanning coal, although some of it has come from the Upper Freeport bed. This coal field includes the north two-thirds of Athens, the northeast corner of Vinton, the eastern portion of Hocking, and that part of Perry County lying south of the Shawnee Branch of the B. & O. Railroad and south of the old C. S. & H. Railroad between Shawnee and Corning and west of the T. & O. C. and K. & M. railroads. The coal beds mined in this district are the Upper Freeport and the Middle Kittanning members, the most important of which is the thick Middle Kittanning bed. The Hocking field of thick Middle Kittanning coal is now thoroughly proved by mines and by test drilling, and the remaining coal reserves are known in this field.

FEDERAL CREEK FIELD

This coal field includes about sixteen square miles in the northeast corner of Athens County. The minable area of coal in this field has been fairly well determined by test drilling and by the operating mines. The coal mined is the Pittsburgh bed.

CROOKSVILLE FIELD

The area included in this coal field is in the northeast part of Perry County, the southwest quarter of Muskingum County, the western portion of Morgan County, and a small area in the northeast corner of Athens County. Mining began in the thin Middle Kittanning bed about 38 years ago. The coal beds mined in this field are the Upper Freeport, Middle Kittanning, and Lower Kittanning members.

POMEROY FIELD

Included in this field are the south half of Meigs County and the northeast corner of Gallia. The field has been proved by test drilling and by operating mines. The coal bed mined is either the Pittsburgh or Pomeroy or Redstone. Coal began to be shipped from the Pomeroy field by river about 1833. Two years later the first tow boat was built and towing coal in barges began on the Ohio River at Pomeroy. The shipping of all rail coal began in this field at the completion of the Hocking Valley and K. & M. railroads connection to Pomeroy in 1892.

CAMBRIDGE FIELD

This field includes the southeast part of Guernsey and the northwest portion of Noble counties. The minable coal beds are the Upper Freeport, the thin Middle Kittanning, and the Meigs Creek. Coal production has come largely from the Upper Freeport bed.

Development of the Cambridge field began in the Upper Freeport bed with the completion of the Cleveland and Marietta Railroad from Marietta to Canal Dover in 1874. The period of activity in this field, therefore, has been 53 years.

EASTERN OHIO OR BELMONT FIELD

The Eastern Ohio or Belmont field of Pittsburgh coal development was begun by Jacob Heatherington and his mule "Jack" on a three-acre lease near Bellaire about 1830. The coal was flat-boated to points along the Mississippi River for the use of sugar refineries.

The all-rail coal development in this field has all been made since the completion of the three direct railroad outlets to the lake, and the extension of the Pennsylvania Lines into this area. The largest develop-

ment has been within the last 26 years and mainly from the Pittsburgh member.

There is some Meigs Creek coal of minable thickness above the Pittsburgh bed. A test drill hole put down at McLain near Bellaire shows the Middle Kittanning bed with a thickness of 4.48 feet at a depth of 567.58 feet below the Pittsburgh bed. This indicates that the eastern Ohio Pittsburgh field may be underlain by a bed of Middle Kittanning coal of minable thickness. The estimated coal reserves remaining in this field are based on the Pittsburgh coal only. This field includes all of Belmont, the southern half of Jefferson, the southeast part of Harrison, and the northern part of Monroe counties.

COSHOCTON FIELD

The Coshocton coal field is located in the central portion of Coshocton County. The minable coal beds in this field are the Lower Kittanning, Middle Kittanning, and the Upper Freeport.

SHERRODSVILLE FIELD

This field includes a portion of the northeast part of Tuscarawas County, the southwest portion of Carroll County, and the northwest portion of Harrison County. The coals mined are Lower Kittanning, Middle Kittanning, and the Upper Freeport.

Both the Coshocton and the Sherrodsville fields are located on the main line of the Pennsylvania Railroad, and each is provided with railroad outlet north to the lakes by the Wheeling and Lake Erie Railroad. Development of these fields dates from the completion of these railroads, about 1880.

BERGHOLZ–SALINEVILLE FIELD

The Bergholz-Salineville field includes two small detached areas of developed coal occupying the southeast corner of Carroll County, the north part of Jefferson County, and the south part of Columbiana County. The Bergholz portion of this field began to develop on the completion of the L. E. & W. Railroad about 1884. The Salineville field began developing at the building of the C. & P. Railroad and its connections north to the lakes. The coals mined in the Bergholz-Salineville field are the Lower Freeport, Upper Freeport, and the Mahoning.

PALESTINE–LISBON FIELD

The Palestine-Lisbon field occupies the northeastern quarter of Columbiana County and a small area in the southern part of Mahoning County. The coal beds mined are the Lower Kittanning, Middle Kittanning, Upper Freeport, and Mahoning. This coal field began development with the building of the P. F. W. & C. Railroad.

PALMYRA FIELD

The Palmyra coal field occupies a small area in the southeastern portion of Portage County and the northwestern part of Mahoning County. This field was brought into operation by the building of the P. L. E. & W. Railroad. The Sharon or No. 1 coal is the bed mined in this field. It is claimed that coal was first discovered at Tallmadge, in 1825, by F. H. Wright, while digging a ground hog out from under a stump. There is some doubt as to where and by whom the discovery of Ohio coal can be credited, since there are varying references made to coal in some of the public records and maps bearing dates of about this time. Probably the first coal systematically worked in Ohio was mined at Tallmadge, and was shipped to Cleveland by Henry Newberry in 1828. It was offered to steamboats as a substitute for wood. The value of Summit County coal was not fully recognized until twenty years later. About this time Governor Todd began mining at Youngstown and shipments were made by canal.

MASSILLON FIELD

The Massillon coal field occupies the southeast part of Medina County, the southwest portion of Summit County, the eastern part of Wayne County, and western portion of Stark County. The principal coal production is from the Sharon bed, although there is some coal produced in this field from the Brookville, Lower Kittanning, and Middle Kittanning members. This field began development about 1864 by the completion of the Cleveland and Mahoning Valley Railroad.

The most important of the fifteen coal districts are the Eastern Ohio field of Pittsburgh coal, the Hocking field of Middle Kittanning coal, and the Cambridge field of Upper Freeport coal. These three districts alone originally contained two-thirds of the proved Ohio coal reserve.

The annual production of coal from these three districts amounts to more than eighty per cent of the total annual coal production for Ohio.

THE UNCERTAINTY OF COAL BEDS

The coal beds have distinctive characteristics in different parts of the State. The same bed is found in minable condition in one locality, and is either absent or worthless at another. Not one of the coal beds continues unbroken, or with uniform thickness and quality over the coal-bearing area. The theory of coal formation suggests that each bed must constitute a relatively narrow strip of coal of indefinite width bordering the arm of the water around which it grew. The mining of the various coal beds has exposed many kinds of faults, replacements, or cutouts, which have rendered a portion of the area unminable or

worthless. Some of the coals have been found more dependable than others, yet experience has taught us that it is very unsafe to take for granted that any of them will hold true in character and in quality through any considerable area. Such conditions as these render it impossible to make an accurate estimate of the Ohio coal reserve until the whole of its coal areas have been thoroughly prospected by mining and test drilling, and the minable coal areas have all been definitely located and defined.

LOSSES OF COAL IN MINING

The amount of coal that has been lost in the process of mining in Ohio is a question about which there may be widely differing opinions. There is no doubt but that such losses were greater in the early days of Ohio mining than they are now with the present improved methods and systems of mining. A loss of 30 per cent of the coal mined has been assumed and has been added to the total coal mined in Ohio to date of January 1, 1927, which should give the total coal depletion for Ohio. This total coal depletion is subtracted from the estimated Ohio recoverable coal reserve before any of the coal was mined. This should give a conservative estimate of the remaining Ohio coal reserve, which is a total recovery of about 60 per cent.

TOTAL OHIO COAL DEPLETION TO JANUARY 1, 1927

It is impossible to ascertain the actual amount of coal that has been mined in Ohio. Until 1872 no attempt was made to collect the statistics of the State's coal production. The early statistics give only the lump and nut coal produced, and even these are very incomplete. To all such figures the writer has added twenty per cent for pea and slack to bring the tonnage up to the equivalent of the run-of-mine coal. The earliest production statistics obtainable begin with 1828, which is probably at or near to the beginning of the Ohio coal production. The earliest figures by counties date from 1883 and have been collected and published in the reports of the Ohio Chief Mine Inspector. Following is a tabulated statement by counties showing the estimated area in square miles of the proved minable coal beds in Ohio with their average thickness of clean coal. It is estimated that there is at least 1731 square miles of unexplored probable coal area, assuming that 80 per cent of this area contains one minable seam of coal three feet thick. This estimated quantity is added to the amount of proved coal tonnage. In four of the most important districts these estimates have been compared with the estimates made by well-known mining engineers employed in these districts and in each instance the writer's estimates have been somewhat larger.

ORIGINAL AMOUNT OF PROVED RECOVERABLE COAL UNDER PRESENT CONDITIONS AND MINING PRACTICE IN OHIO, JANUARY 1, 1927

(285 x 640) x 3.5 x 1500

Name of coal bed	Area of proved coal, in square miles	Average thickness clean coal, in feet	Estimated tons run-of-mine recoverable coal
Meigs Creek coal	285	3.5	957,600,000
Pittsburgh and Pomeroy coals	816	5.5	4,168,704,000
Upper Freeport coal	161	5.2	803,712,000
Middle Kittanning coal, thick	224	7.0	1,505,280,000
Middle Kittanning coal, thin	662	3.5	2,224,320,000
Lower Kittanning coal	143	3.25	439,296,000
Clarion coal	16	4.0	61,440,000
Brookville coal	19	3.5	63,840,000
Quakertown coal	32	2.7	82,944,000
Sharon coal	32	3.0	92,160,000
Total	2,390		10,399,296,000
Total estimated unproved coal area	1,751		
Estimated coal on unproved area			4,000,000,000
Total area all coal beds	4,141		
Recoverable run-of-mine coal, total estimate			14,399,296,000

TOTAL COAL MINED AND LOST IN MINING IN OHIO AS OF JANUARY 1, 1927

Period of time	Total tons mined run-of-mine	Total estimated coal lost in mining, tons	Total depletion, tons
1828 to 1883	109,956,583	33,119,165	143,075,748
1883 to 1913	551,507,428	165,452,228	716,959,656
1913 to 1927	468,600,078	200,828,605	669,428,683
Total	1,130,064,089	399,399,998	1,529,464,087

OHIO COAL RESERVES REMAINING IN TONS RUN-OF-MINE, JANUARY 1, 1927

Total estimated original Ohio recoverable coal reserve	14,399,296,000
Less total depletion to January 1, 1927	1,529,464,087
Total estimated tons run-of-mine recoverable coal remaining in Ohio, January 1, 1927	12,869,831,913

TOTAL RUN-OF-MINE COAL PRODUCED IN OHIO BY YEARS FROM 1828 TO 1882, INCLUSIVE

Coal was first mined in Ohio at Tallmadge in 1828 but the State did not begin to keep records of the coal production by counties until 1883. The writer has interpolated the Ohio coal production for the years 1828 to 1839; the figures for the years 1840 to 1882 are taken from Mineral Resources, Volume II, 1908. These tonnage figures are given for lump and nut coal. Ten per cent has been added for slack coal to get the equivalent tons of run-of-mine coal for these years. The production for the years 1883 to 1926 inclusive are taken from the Ohio State records.

Year	Tons	Year	Tons	Year	Tons
1828	20,900	1847	528,000	1866	2,076,166
1829	31,900	1848	594,000	1867	2,301,567
1830	42,900	1849	660,000	1868	2,723,425
1831	53,900	1850	704,000	1869	2,708,184
1832	64,900	1851	537,000	1870	2,780,113
1833	75,900	1852	770,000	1871	4,400,000
1834	86,900	1853	836,000	1872	5,846,794
1835	97,900	1854	880,000	1873	5,005,028
1836	108,900	1855	979,000	1874	3,594,285
1837	119,900	1856	1,023,000	1875	5,350,259
1838	131,850	1857	1,527,000	1876	3,850,000
1839	137,500	1858	1,100,000	1877	5,775,000
1840	159,860	1859	1,166,000	1878	6,050,000
1841	176,000	1860	1,392,100	1879	6,600,000
1842	247,500	1861	1,265,000	1880	6,716,595
1843	308,000	1862	1,320,000	1881	10,164,000
1844	374,000	1863	1,324,951	1882	10,395,000
1845	429,000	1864	1,996,562		
1846	462,000	1865	1,689,839	Total	109,758,578

PROVED MINABLE COAL AREAS IN OHIO

Estimate made on basis of present mining practice and 2.7 feet minimum thickness of coal

County	Total area of coal measures in square miles	Unexplored coal areas in square miles	Proved minable coal in square miles										
			Meigs Creek coal, average thickness 3.5	Pittsb'gh and Pomeroy coals, average thickness 5.5	Upper Freeport coal, average thickness 5.2	Thick Middle Kittanning coal, average thickness 7.0	Thin Middle Kittanning coal, average thickness 3.5	Lower Kittanning coal, average thickness 3.2	Clarion coal, average thickness 4.0	Brookville coal, average thickness 3.5	Quakertown coal, average thickness 2.7	Sharon coal, average thickness 3.0	Total area of proved coal in all beds
Athens	483	.....	.....	18	6	156	10	.....	.....	.....	.....	.....	190
Belmont	478	.....	270	415	.....	.....	.....	.....	.....	.....	.....	.....	685
Carroll	400	160	.....	.....	10	.....	20	10	.....	.....	.....	.....	40
Columbiana	510	330	.....	.....	15	.....	75	.....	.....	.....	.....	.....	90
Coshocton	480	90	.....	.....	.....	.....	92	.....	.....	.....	.....	.....	92
Gallia	500	100	.....	8	.....	.....	.....	20	5	.....	.....	.....	33
Guernsey	442	140	.....	10	90	.....	60	.....	.....	.....	.....	.....	160
Harrison	350	.....	10	110	10	.....	.....	.....	.....	.....	.....	.....	130
Hocking	215	.....	.....	.....	.....	31	.....	.....	.....	.....	3	.....	34
Holmes	259	.....	.....	.....	.....	.....	10	.....	.....	.....	.....	.....	10
Jackson	375	30	.....	.....	.....	.....	.....	40	4	.....	25	.....	69
Jefferson	360	.....	.....	110	.....	.....	50	.....	.....	.....	.....	.....	160
Lawrence	400	130	.....	.....	.....	.....	.....	50	.....	.....	.....	.....	50
Mahoning	585	55	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	5
Medina	130	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	5
Meigs	380	20	.....	112	.....	.....	.....	.....	.....	.....	.....	.....	112
Monroe	405	.....	.....	33	.....	.....	.....	.....	.....	.....	.....	.....	33
Morgan	531	.....	.....	.....	.....	.....	92	.....	.....	.....	.....	.....	92
Muskingum	550	300	.....	.....	10	.....	50	.....	.....	.....	.....	.....	60
Noble	372	141	5	.....	15	.....	.....	.....	.....	.....	.....	.....	20
Perry	342	.....	.....	.....	.....	37	133	.....	.....	.....	.....	.....	170
Portage	450	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	5
Scioto	176	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	2
Stark	550	90	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	11
Summit	330	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	3
Trumbull	180	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2
Tuscarawas	530	100	.....	.....	5	.....	65	12	.....	.....	.....	.....	82
Vinton	338	65	.....	.....	.....	.....	.....	6	5	19	4	1	35
Washington	540	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	5
Wayne	155	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	5
Total	11,796	1,751	285	816	161	224	662	143	16	19	32	32	2,390

INSERT—G. B. 34.

County	Meigs Creek coal, average thickness 3.5 ft.	Pittsburgh and Pomeroy coals, average thickness 5.5 ft.	Upper Freeport coal, average thickness 5.2 ft.	Thick Middle Kittanning coal, average thickness 7.0 ft.	Thin Middle Kittanning coal, average thickness 3.5 ft.	Lower Kittanning coal, average thickness 3.2 ft.	Clarion coal, average thickness 4.0 ft.	Brookville coal, average thickness 3.5 ft.	Quaker-town coal, average thickness 2.7 ft.	Sharon coal, average thickness 3.0 ft.	Total tons run-of-mine, all minable proved coal
Athens	.....	95,040,000	29,952,000	1,048,320,000	33,600,000	.....	.....	.....	.....	.....	1,206,912,000
Belmont	907,200,000	2,191,200,000	.....	.....	.....	.....	.....	.....	.....	.....	3,098,400,000
Carroll	.....	.....	49,920,000	.....	67,200,000	30,720,000	.....	.....	.....	.....	147,840,000
Columbiana	.....	.....	74,880,000	.....	252,000,000	.....	.....	33,600,000	.....	.....	360,480,000
Coshocton	.....	.....	.....	.....	309,120,000	.....	.....	.....	.....	.....	309,120,000
Gallia	.....	42,240,000	.....	.....	.....	61,440,000	19,200,000	.....	.....	.....	122,880,000
Guernsey	.....	52,800,000	449,280,000	.....	201,600,000	.....	.....	.....	.....	.....	703,680,000
Harrison	33,600,000	580,800,000	49,920,000	.....	.....	.....	.....	.....	.....	.....	664,320,000
Hocking	.....	.....	.....	208,320,000	.....	.....	.....	.....	7,776,000	.....	216,096,000
Holmes	.....	.....	.....	.....	33,600,000	.....	.....	.....	.....	.....	33,600,000
Jackson	.....	.....	.....	.....	.....	122,880,000	15,360,000	.....	64,800,000	.....	203,040,000
Jefferson	.....	580,800,000	.....	.....	168,000,000	.....	.....	.....	.....	.....	748,800,000
Lawrence	.....	.....	.....	.....	.....	153,600,000	.....	.....	.....	.....	153,600,000
Mahoning	.....	.....	.....	.....	.....	15,360,000	.....	16,800,000	.....	.....	32,160,000
Medina	.....	.....	.....	.....	.....	.....	.....	.....	.....	14,400,000	14,400,000
Meigs	.....	451,584,000	.....	.....	.....	.....	.....	.....	.....	.....	451,584,000
Monroe	.....	174,240,000	.....	.....	.....	.....	.....	.....	.....	.....	174,240,000
Morgan	.....	.....	.....	.....	309,120,000	.....	.....	.....	.....	.....	309,120,000
Muskingum	.....	.....	49,920,000	.....	168,000,000	.....	.....	.....	.....	.....	217,920,000
Noble	16,800,000	.....	74,880,000	.....	.....	.....	.....	.....	.....	.....	91,680,000
Perry	.....	.....	.....	248,640,000	446,880,000	.....	.....	.....	.....	.....	695,520,000
Portage	.....	.....	.....	.....	.....	.....	.....	.....	.....	14,400,000	14,400,000
Scioto	.....	.....	.....	.....	.....	.....	7,680,000	.....	.....	.....	7,680,000
Stark	.....	.....	.....	.....	.....	.....	.....	.....	.....	31,680,000	31,680,000
Summit	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,640,000	8,640,000
Trumbull	.....	.....	.....	.....	.....	.....	.....	.....	.....	5,760,000	5,760,000
Tuscarawas	.....	.....	24,960,000	.....	218,400,000	36,864,000	.....	.....	.....	.....	280,224,000
Vinton	.....	.....	.....	.....	.....	18,432,000	19,200,000	13,440,000	10,368,000	2,880,000	64,320,000
Washington	.....	.....	.....	.....	16,800,000	.....	.....	.....	.....	.....	16,800,000
Wayne	.....	.....	.....	.....	.....	.....	.....	.....	.....	14,400,000	14,400,000
Total	957,600,000	4,168,704,000	803,712,000	1,505,280,000	2,224,320,000	439,296,000	61,440,000	63,840,000	82,944,000	92,160,000	10,399,296,000

INSERT—G. B. 34.

PRODUCTION OF COAL BY COUNTIES FOR YEARS 1883 TO 1912 (T

County	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	189
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	To
Athens	915,515	627,944	823,139	899,046	1,083,543	1,336,698	1,466,328	1,420,280	1,374,320	1,590,507	1,622,851	1,457,579	1,435,744	1,38
Belmont	622,326	643,129	744,446	533,779	721,767	1,108,106	814,699	827,568	1,259,570	1,249,423	1,277,540	1,193,329	961,367	1,08
Carroll	188,615	102,531	150,695	216,630	293,328	355,092	430,995	420,078	205,521	273,272	290,259	285,180	326,670	27
Columbiana	622,082	469,708	462,733	336,063	516,057	466,191	628,041	544,851	664,569	610,179	636,608	501,783	644,823	51
Coshocton	86,300	56,562	99,609	52,934	12,479	167,903	156,341	146,837	205,193	244,149	305,769	181,127	161,723	34
Gallia	10,956	20,372	16,383	17,426	15,365	16,722	14,868	15,160	18,277	19,634	5,292	13,361	10,341	
Guernsey	244,650	375,427	277,267	433,800	553,613	383,728	317,397	547,072	498,859	572,281	534,416	641,561	972,505	1,06
Harrison	.....	.....	.....	5,509	4,032	2,865	1,080	4,792	4,316	8,646	14,698	27,537	26,003	2
Hocking	639,159	372,694	656,441	741,571	853,063	1,086,538	911,488	1,239,576	1,622,429	1,863,303	1,889,996	1,453,391	1,432,741	1,35
Holmes	26,400	12,052	11,459	12,670	10,526	8,121	10,142	13,358	16,811	16,666	14,181	15,616	12,665	1
Jackson	490,504	831,720	791,608	856,740	1,135,605	1,088,761	1,257,731	1,291,778	1,598,876	1,770,742	1,778,770	1,499,287	2,072,939	1,65
Jefferson	221,022	316,777	271,329	275,666	293,875	243,178	294,664	571,909	666,187	879,500	1,138,083	997,888	861,185	67
Lawrence	170,793	176,412	145,916	166,933	143,559	137,806	111,815	108,505	88,440	127,074	80,741	75,292	125,280	8
Mahoning	266,371	241,599	275,944	313,040	272,349	231,035	217,118	228,761	232,346	242,515	198,370	97,062	101,866	5
Medina	316,780	77,160	152,721	252,411	225,487	198,452	132,706	181,861	157,410	220,149	197,405	143,196	265,411	19
Meigs	397,557	248,436	234,756	192,263	185,205	242,483	228,156	268,599	299,402	308,127	278,562	219,971	216,897	25
Monroe	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,868	2,411	5,483	
Morgan	.....	7,636	5,536	4,370	4,100	.....	.....	.....	.....	19,000	14,500	13,599	17,930	1
Muskingum	37,400	84,398	86,846	96,601	171,928	211,861	232,298	249,666	232,918	264,473	364,067	248,286	255,230	26
Noble	.....	.....	.....	3,342	6,320	6,200	14,281	11,565	9,560	9,995	15,360	21,867	19,376	4
Perry	1,885,199	1,379,100	1,259,592	1,607,666	1,870,841	1,736,805	1,549,450	1,714,762	1,759,790	2,056,896	2,171,495	1,460,831	1,789,109	1,70
Portage	79,500	65,647	77,071	70,339	65,163	70,923	65,286	70,687	68,612	87,925	94,586	92,946	87,012	4
Scioto	.....	3,650	2,440	.....	.....	.....	.....	1,090	.....	1,180	769	1,391	3,875	
Stark	390,775	513,225	391,418	593,422	784,164	793,297	1,028,649	891,430	925,370	938,519	831,024	456,728	860,733	1,05
Summit	185,500	253,148	145,134	82,225	95,815	112,024	84,438	189,362	143,549	110,299	97,040	27,322	49,260	5
Trumbull	500,612	257,683	264,517	188,531	167,989	157,826	106,480	105,333	64,173	55,775	23,152	33,137	29,809	
Tuscarawas	394,066	317,141	285,545	267,666	506,466	546,117	643,866	565,105	733,374	887,106	794,681	651,903	753,286	61
Vinton	47,800	69,740	77,127	60,013	89,727	108,695	98,749	86,611	104,366	88,305	76,144	62,496	61,068	4
Washington	.....	5,600	5,000	5,500	1,880	2,432	2,770	3,835	3,796	3,480	1,936	2,000	4,533	
Wayne	162,847	120,571	81,507	109,057	105,150	91,157	86,549	71,431	91,553	80,188	64,934	32,142	119,015	6
Total coal mined	8,902,729	7,650,062	7,796,179	8,395,213	10,189,396	10,911,016	10,906,385	11,791,862	13,049,587	14,599,308	14,818,097	11,910,219	13,683,879	12,91

INSERT—G. B. 34.

...Continued

PRODUCTION OF COAL BY COUNTIES FOR YEARS 1883 TO 1912 (Taken from State records published in Bulletin 12, College of Engineering, Ohio State University)

1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	Total
Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
1,336,698	1,466,328	1,420,280	1,374,320	1,590,507	1,622,851	1,457,579	1,435,744	1,383,709	1,299,454	1,533,188	1,761,775	2,594,859	3,066,533	3,666,993	3,905,904	3,854,078	3,848,440	4,370,912	4,753,044	4,170,995	4,354,074	5,943,638	4,532,595	4,886,476	75,980,161
1,108,106	814,699	827,568	1,259,570	1,249,423	1,277,540	1,193,329	961,367	1,082,964	905,378	1,168,567	1,259,520	1,595,369	1,544,832	2,058,066	2,612,025	3,283,089	3,871,846	4,467,295	6,355,582	5,591,719	5,993,418	8,336,428	8,040,333	9,316,850	79,440,330
355,092	430,995	420,078	205,521	273,272	290,259	285,180	326,670	278,296	162,537	261,535	212,051	205,641	254,510	251,652	326,095	354,594	235,826	209,360	371,542	439,080	398,085	309,328	269,687	310,018	8,388,703
466,191	628,041	544,851	664,569	610,179	636,608	501,783	644,823	516,005	735,041	886,053	799,474	718,108	792,533	868,426	874,602	721,144	705,824	554,047	686,585	516,780	714,325	740,345	668,039	482,878	19,083,897
167,903	156,341	146,837	205,193	244,149	305,769	181,127	161,723	342,625	326,981	342,904	364,702	366,145	360,635	410,309	422,221	326,467	388,932	358,128	397,229	366,805	390,302	435,903	438,369	356,299	8,271,882
16,722	14,868	15,160	18,277	19,634	5,292	13,361	10,341	6,671	15,704	17,391	14,470	16,138	15,740	26,450	23,889	18,979	18,551	43,895	36,635	13,692	9,920	13,923	17,114	27,523	530,842
383,728	317,397	547,072	498,859	572,281	534,416	641,561	972,505	1,068,453	861,776	1,176,524	1,313,774	1,904,381	2,094,887	2,968,108	2,715,946	3,084,220	2,896,526	3,348,934	4,009,141	2,926,448	3,108,686	4,473,022	3,901,529	4,333,963	52,538,894
2,865	1,080	4,792	4,316	8,646	14,698	27,537	26,003	28,391	28,159	38,144	29,852	36,087	111,847	293,841	249,106	307,206	402,679	335,928	489,118	447,805	576,162	599,741	476,914	750,831	5,301,289
1,086,538	911,488	1,239,576	1,622,429	1,863,303	1,889,996	1,453,391	1,432,741	1,351,511	1,381,414	1,254,740	1,929,753	2,311,679	2,348,869	2,118,805	1,967,636	1,894,869	1,695,763	1,553,507	1,392,616	1,282,647	1,036,743	1,451,147	1,547,839	2,046,175	43,328,103
8,121	10,142	13,358	16,811	16,666	14,181	15,616	12,665	10,164	19,313	15,601	12,321	12,966	16,548	17,187	32,099	30,850	24,820	43,080	14,447	18,768	15,844	13,203	11,242	11,059	500,179
1,088,761	1,257,731	1,291,778	1,598,876	1,770,742	1,778,770	1,499,287	2,072,939	1,651,199	1,649,493	1,804,792	2,179,757	2,319,321	2,141,466	2,316,123	2,412,116	1,958,538	1,887,904	1,452,176	1,303,529	836,997	823,034	933,238	673,663	783,334	43,591,741
243,178	294,664	571,909	666,187	879,500	1,138,083	997,888	861,185	670,867	744,790	829,526	935,975	971,209	1,303,308	1,789,452	2,320,419	2,495,375	3,337,799	2,998,476	4,648,263	3,565,008	4,056,148	5,111,563	4,321,829	4,641,908	51,773,178
137,806	111,815	108,505	88,440	127,074	80,741	75,292	125,280	81,746	124,448	68,835	135,064	112,873	143,678	186,635	249,139	194,192	212,949	257,049	246,562	180,265	214,685	190,465	84,567	88,104	4,429,822
231,035	217,118	228,761	232,346	242,515	198,370	97,062	101,866	52,277	92,283	75,149	74,309	109,348	52,765	94,773	89,218	86,495	117,074	121,412	95,280	86,326	63,974	66,312	64,276	47,511	4,307,158
198,452	132,706	181,861	157,410	220,149	197,405	143,196	265,411	195,669	159,987	147,714	158,216	152,767	183,391	139,933	136,803	103,910	91,205	104,729	47,181	18,103	12,465	27,604	16,942	10,395	4,228,163
242,483	228,156	268,599	299,402	308,127	278,562	219,971	216,897	259,296	203,861	193,335	225,149	249,060	255,892	340,700	388,568	212,395	370,587	530,476	375,033	482,630	543,595	648,149	532,840	635,940	9,767,920
.....	.....	.....	.....	.....	4,868	2,411	5,483	2,835	2,807	4,451	2,720	2,933	308	132	164	.....	.....	.....	.....	.....	.....	.....	.....	180	29,292
.....	.....	.....	.....	19,000	14,500	13,599	17,930	19,080	22,165	26,940	24,881	29,954	33,504	50,437	82,315	83,700	173,551	222,891	290,422	217,036	187,241	126,544	175,699	196,622	2,049,653
211,861	232,298	249,666	232,918	264,473	364,067	248,286	255,230	264,105	339,660	250,718	220,854	311,547	226,375	286,532	305,933	300,310	242,011	368,320	442,278	436,947	416,217	270,416	410,777	522,198	8,151,170
6,200	14,281	11,565	9,560	9,995	15,360	21,867	19,376	42,507	63,967	62,912	66,714	89,046	82,844	34,992	52,247	154,970	171,509	409,114	309,349	208,192	379,055	441,823	480,524	641,677	3,809,308
1,736,805	1,549,450	1,714,762	1,759,790	2,056,896	2,171,495	1,460,831	1,789,109	1,703,816	1,449,178	1,789,890	1,748,522	2,517,258	2,563,051	2,830,962	2,731,595	2,491,682	2,390,570	2,609,701	2,921,754	2,108,050	2,076,407	2,394,961	2,021,594	2,164,130	60,754,657
70,923	65,286	70,687	68,612	87,925	94,586	92,946	87,012	48,060	79,245	75,851	114,778	103,241	86,781	97,928	101,889	97,692	83,603	109,227	96,463	88,543	102,624	105,155	115,080	83,293	2,585,150
.....	.....	1,090	.....	1,180	769	1,391	3,875	1,785	17,119	12,140	8,424	11,657	10,349	8,351	8,515	12,224	9,013	10,331	13,508	8,460	8,916	9,834	5,599	7,794	178,414
793,297	1,028,649	891,430	925,370	938,519	831,024	456,728	860,733	1,056,979	777,042	867,097	1,073,750	1,150,232	1,049,093	1,184,749	926,180	761,173	774,832	772,583	737,017	524,052	458,392	547,635	442,860	417,823	22,920,243
112,024	84,438	189,362	143,549	110,299	97,040	27,322	49,260	53,666	83,238	65,378	86,100	122,988	123,541	93,586	44,329	84,208	115,529	96,997	99,971	103,299	78,268	94,346	85,711	82,032	3,088,303
157,826	106,480	105,333	64,173	55,775	23,152	33,137	29,809	7,172	10,838	7,471	11,059	19,181	12,148	8,143	8,476	6,635	3,591	1,956	1,895	7,534	5,405	4,716	3,496	2,989	2,077,722
546,117	643,866	565,105	733,374	887,106	794,681	651,903	753,286	613,563	730,473	950,913	1,053,938	1,267,185	1,324,570	1,577,654	1,328,951	1,296,876	1,361,394	1,429,565	1,776,566	1,331,248	1,513,900	811,782	670,251	1,311,301	27,696,452
108,695	98,749	86,611	104,366	88,305	76,144	62,496	61,068	46,503	75,445	85,144	71,072	77,231	88,024	110,423	154,934	240,524	224,275	220,904	249,475	183,542	128,728	159,006	129,986	100,084	3,376,141
2,432	2,770	3,835	3,796	3,480	1,936	2,000	4,533	3,646	2,974	3,634	2,090	2,679	1,738	3,930	4,000	3,800	3,600	1,920	691	1,304	1,232	.....	355	523	80,878
91,157	86,549	71,431	91,553	80,188	64,934	32,142	119,015	69,058	84,052	41,598	18,557	45,566	31,530	94,015	97,952	123,520	165,224	204,573	204,773	125,525	86,987	164,724	202,329	184,381	3,160,465
0,911,016	10,906,385	11,791,862	13,049,587	14,599,308	14,818,097	11,910,219	13,683,879	12,912,618	12,448,822	14,058,135	15,909,621	19,426,649	20,321,290	23,929,287	24,573,266	24,583,715	25,825,427	27,207,486	32,365,949	26,287,800	27,754,832	34,424,951	30,342,039	34,444,291	551,420,110

PRODUCTION OF COAL BY COUNTIES FOR YEARS 1913 TO 1926 INCLUSIVE (Taken from records of Department of Industrial Relations of Ohio)

County	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	Total
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
Athens	5,239,631	3,415,057	2,536,793	3,743,672	6,313,619	6,742,867	5,181,643	6,872,646	4,154,994	3,368,351	4,444,351	2,972,483	2,502,126	2,765,451	60,253,684
Belmont	10,454,795	2,624,023	4,403,754	10,553,088	11,156,626	12,030,431	9,999,648	10,953,668	11,634,028	6,802,199	13,295,035	10,973,909	9,263,176	9,128,799	133,273,179
Carroll	369,437	241,186	328,407	326,714	487,092	518,996	361,823	388,513	287,838	371,511	464,854	344,719	312,895	396,772	5,200,757
Columbiana	565,254	398,108	543,943	518,862	616,925	738,473	650,971	957,811	566,880	699,231	974,092	299,921	290,099	394,929	8,215,499
Coshocton	370,893	166,617	237,568	316,045	371,785	438,919	274,998	458,841	224,729	269,493	287,365	237,573	253,541	265,539	4,173,906
Gallia	20,561	14,886	7,350	6,883	28,270	27,122	12,514	22,207	9,367	22,993	11,902	12,308	10,935	3,001	210,299
Guernsey	4,324,682	2,970,815	3,247,938	4,397,262	4,024,265	4,497,303	3,342,915	3,760,463	2,983,034	2,115,065	3,344,801	2,633,807	1,097,538	1,231,533	43,971,421
Harrison	752,600	203,485	308,570	990,641	1,222,561	1,772,670	1,452,061	1,917,607	1,879,116	2,302,547	2,854,753	2,422,023	2,836,495	2,478,139	23,393,268
Hocking	1,587,163	1,192,230	1,421,117	1,435,188	2,211,858	2,332,304	1,162,366	1,855,499	567,704	763,098	78,797	712,102	865,557	608,129	16,793,112
Holmes	9,998	15,883	16,464	14,826	20,144	13,431	11,512	9,645	9,484	12,751	14,959	27,221	18,577	17,172	212,067
Jackson	596,497	559,332	572,941	727,999	1,016,249	1,018,063	478,474	841,314	187,886	336,036	273,944	160,937	183,853	159,537	7,113,062
Jefferson	5,095,024	2,067,577	3,539,979	5,366,393	5,742,240	7,239,909	4,964,610	6,713,531	4,441,357	4,527,809	6,554,154	4,337,603	4,888,948	5,110,294	70,589,428
Lawrence	195,389	162,709	131,971	166,261	241,333	322,917	140,433	286,399	58,731	156,151	135,159	112,826	122,795	105,340	2,338,414
Licking	.....	.....	.....	.....	.....	655	.....	.....	.....	.....	.....	.....	.....	.....	655
Mahoning	27,457	26,055	24,167	28,842	50,537	64,832	40,160	55,985	40,550	58,182	66,328	56,998	50,814	59,203	650,110
Medina	9,990	10,674	7,717	9,205	10,088	7,353	5,249	6,652	2,404	1,222	10,871	6,336	7,409	7,976	103,146
Meigs	659,019	567,210	954,281	1,025,036	1,267,144	1,373,479	877,516	1,539,162	941,773	736,480	1,234,463	232,792	684,193	920,059	13,012,607
Monroe	.....	803	544	988	682	841	312	516	439	128	411	433	736	535	7,368
Morgan	281,445	194,743	105,276	258,721	326,008	380,046	208,671	276,852	198,788	168,281	214,975	182,294	278,874	309,455	3,384,429
Muskingum	495,595	371,273	392,332	396,289	541,261	671,666	399,364	669,960	193,920	434,843	469,671	380,788	316,029	230,822	5,963,813
Noble	784,555	507,010	608,735	864,695	918,519	994,989	809,317	638,237	540,694	341,626	707,247	493,301	364,418	431,431	9,004,774
Perry	2,217,816	1,349,323	1,172,687	1,195,127	2,445,114	3,514,841	2,580,890	3,700,511	1,600,510	1,841,754	2,520,474	1,785,700	1,497,684	1,706,052	29,128,483
Portage	84,289	54,569	60,396	69,432	92,439	88,523	75,310	121,943	67,615	66,012	95,015	83,396	68,053	62,145	1,089,137
Scioto	5,867	4,170	2,443	617	2,608	1,086	860	889	793	4,470	3,265	1,868	1,008	1,063	31,007
Stark	453,772	469,388	371,683	335,487	471,034	535,423	325,923	498,118	310,120	537,116	550,496	462,552	472,227	410,138	6,203,477
Summit	82,331	58,287	51,432	38,260	29,680	55,676	37,397	17,744	12,632	32,589	27,399	14,694	15,864	5,567	479,552
Trumbull	2,185	1,113	1,182	1,116	1,266	1,750	1,347	2,614	813	1,324	1,039	.....	.....	.....	15,749
Tuscarawas	1,387,026	906,459	1,400,163	1,547,110	1,788,800	2,120,837	1,595,620	2,231,345	1,207,139	1,388,546	1,345,540	1,073,558	1,084,320	1,153,600	20,230,063
Vinton	118,007	72,432	105,806	106,376	212,940	377,892	166,881	340,866	95,118	130,058	111,181	86,043	71,019	71,943	2,066,562
Washington	615	615	653	421	1,137	2,498	4,543	16,687	5,719	8,276	3,903	1,619	2,056	3,844	52,586
Wayne	93,575	90,375	70,754	84,996	65,762	33,410	62,580	70,837	18,687	28,413	6,781	7,289	3,021	639	637,119
Total coal mined	36,285,468	18,716,407	22,627,046	34,526,552	41,677,986	47,919,202	35,225,908	45,227,062	32,242,862	27,526,555	40,103,225	30,117,093	27,564,260	28,039,107	467,798,733

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